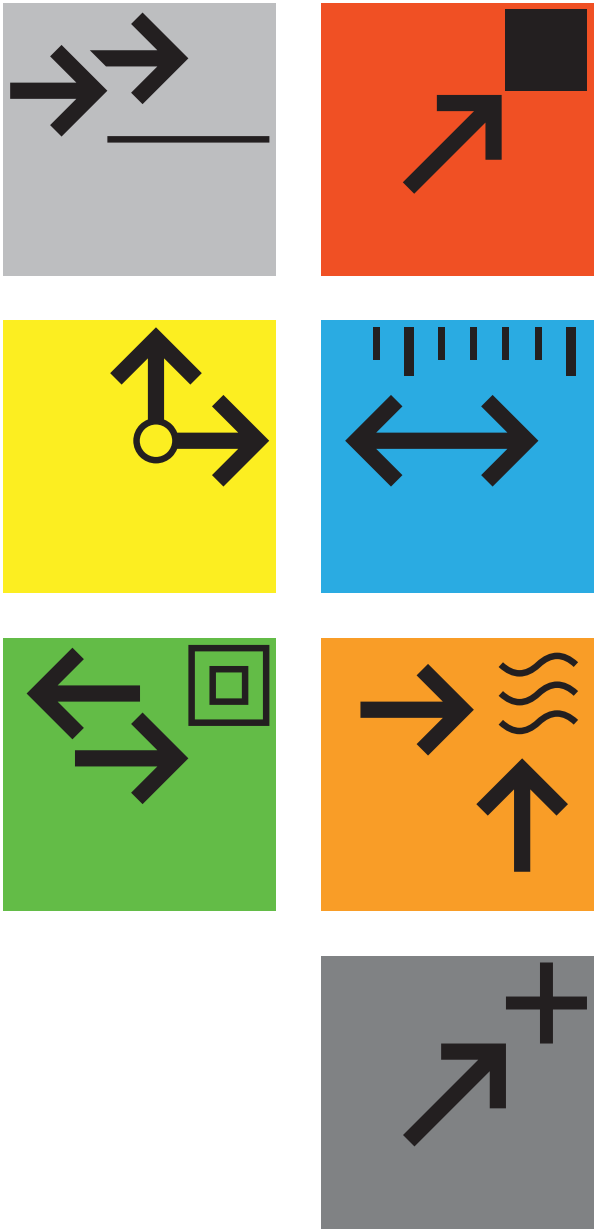
BALLUFF

sensors worldwide



Products + News

- **Products + News**
  Superior quality for efficient automation
- **Services**
  Customized according to your specifications
- **Profinet**
  Now with eight IO-Link master ports
- **Ultrasonic sensors**
  Accurate, precise and reliable
- **Inductive mini-sensors**
  For position sensing in harsh environments
- **and much more ...**

With over 50 years of sensor experience, Balluff is a leading global sensor specialist with its own line of connectivity products for every area of factory automation. Balluff is based in Germany and has a tight international network of 54 representatives and subsidiaries.

Balluff stands for comprehensive systems from a single source, continuous innovation, state-of-the-art technology, highest quality, and greatest reliability. That's not all:
Balluff also stands for exceptional customer orientation, customized solutions, fast worldwide service, and outstanding quality of consultation services.

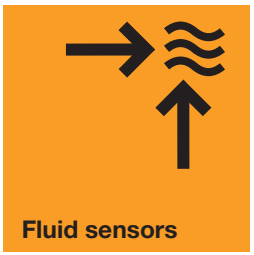
Object Detection

10 BNS ultra-high temperature-resistant multiple and single position switches
12 BES inductive sensors, 8×8 mm TripleProx Shorties
14 Inductive mini-sensors
16 Pressure-resistant inductive mini-sensors up to 100 bar
18 Weld-immune factor 1^+ sensors
20 Ultra-high temperature-resistant inductive sensors
22 New inductive Proxinox sensors
24 Inductive Q40 block sensors with corner LEDs
26 BES Z06K inductive tube sensors
28 Reliable transparency detection with laser fork sensors BGL
30 Reliable web edge control – analog fork sensors BGL
32 Red light and laser through-beam sensors BOS Q08M
34 BOS Q08M diffuse sensor with fixed background suppression
36 Photoelectric sensors M18 with background suppression
38 M18 photoelectric sensors – BOS 18M GlobalProx
40 M18 photoelectric red light sensors
42 M18 photoelectric infrared sensors
44 Photoelectric sensor with Teach-in
46 M18 photoelectric sensors – infrared diffuse sensor for glass detection
48 BOS 23K photoelectric sensors
50 BOS 50K photoelectric sensors – red light
52 BOS 50K photoelectric sensors – Super Long Range Technology
54 BFS 33M true-color sensor
56 Magnetic cylinder sensors for large ranges
58 BMF 235 sensors for pneumatic cylinders
60 BMF 243 sensors for pneumatic cylinders
62 Magnetic cylinder sensors with mounting system
64 Capacitive Global sensors in 40×40 mm size
66 BCS capacitive mini sensors
70 BUS M30M ultrasonic sensors
72 BUS 18M ultrasonic sensors with IO-Link
74 BUS R06K mini-sensor ultrasonic sensors

Linear Position Sensing

78 BSI inclination sensors
80 High-pressure inductive sensors
82 BIP inductive positioning system – perfectly integratable
84 BIP inductive positioning system – Optimum effective length

86 Micropulse transducer BTL6 Profile PF IO-Link
88 Micropulse position measuring system BTL6-V11V Rod BZ
90 Micropulse transducers BTL7
94 Micropulse+ transducer BTL7 Profile P
96 Micropulse transducers BTL AR ZA0



100 BSP pressure sensors
102 Flush-mounted BSP pressure sensors
104 40×40 mm SMARTLEVEL BCS capacitive sensors
106 SMARTLEVEL 500+ capacitive sensors
108 Fork sensors for fluid detection
110 BTL-SF micropulse filling level sensor

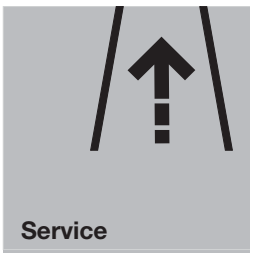
114 BVS-E infrared vision sensors
116 BVS-E identification vision sensors
118 BVS-E vision sensor monitor
120 IP 67+ degree of protection inexpensive retrofit
122 Coaxial lighting
124 3D holder system for vision sensors
126 Spotlights with IP 67 degree of protection
128 Extremely flat background lighting with IP 69K
130 Why RFID from Balluff? – Comprehensive systems expertise
132 Protecting products and expertise know-how
134 Industrial RFID system BIS V – the new generation for more efficiency

140 A powerful high-frequency package ensures maximum transparency
142 Industrial RFID in transfer systems
144 Processor with CC-Link for 13.56 MHz
146 Processor for Mitsubishi controller
148 HF data screw BIS M – better safe than sorry

152 Industrial networking and connectivity – Intelligent and comprehensive networking for system technology
154 Ethernet/IP
156 Profinet
158 Industrial Ethernet
162 CC-Link
164 Distributed Modular I/O
166 IO-Link
174 Inductive Couplers
176 Intelligent Sensors

184 Connectivity solutions
189 Industrial networking and connectivity
191 Non-Contact connectors
193 Intelligent Power Supply
197 IP67 Power Supplies

200 Balluff protection cap for ultrasonic sensors
202 Clamping holder overview – 65 clamping holder versions
204 Contact protector and tube switch



208 Services – According to your specifications

WARNING
Read, understand, and follow warnings and manual. Failure to do so could result in serious injury or death.
NEVER USE AS A SENSING DEVICE FOR PERSONNEL PROTECTION
Does NOT include self-checking redundancy circuitry required for use in personnel safety applications
Does NOT meet OSHA and ANSI standards for point-of-operation devices
Balluff, Inc. · www.balluff.com · 1-800-543-8390

New

Inductive mini-sensors

For position sensing in a harsh environment

Small housing, low weight, and yet the highest switching precision? Balluff mini-sensors fulfill these industrial automation requirements. By means of small designs and peak performance, they offer great freedom of design and enable substantially more applications.

cont. on page 14

BOS 50K photoelectric sensors

Diffuse sensor with enormous range

Conventional diffuse sensors are frequently used in industrial automation. However, these often reach their limits if larger switching distances are involved. Not the case for the new Balluff photoelectric sensors with Super Long Range Technology.

cont. on page 52

BMF 243 cylinder sensors

The new benchmark for every C-slot/ rounded groove

- Solid hold in the slot, sensor cannot be wrenched from the slot
- Can be installed even on cylinders with a dirty slot
- Can also be used in space-critical applications

cont. on page 60

BUS ultrasonic sensors

Precise and reliable

Balluff ultrasonic sensors are extremly precise and reliable. They measure fill levels, heights and sag without making contact as well as count and monitor the presence of objects. And they are particularly suited for critical situations. Dust, dirt, and steam do not pose a problem.

cont. on page 70

Product Highlights
An overview

BSI
inclination sensors

360° – so that nothing gets out of place

The precise position control and continuous positioning of rotational movements are of great importance in many applications. Balluff BSI inclination sensors measure the deviation from the horizontal on an axis of up to 360°. They can be used down to –40°F.

cont. on page 78

MICROPULSE
BTL6 Profile PF IO-Link

Fast installation and commissioning

The Micropulse PF IO-Link is an absolute and non-contact position measuring system that continuously provides measurements in µm in the 1-ms cycle. These measurements are directly and digitally transmitted via IO-Link. IO-Link is a point-to-point connection within any network.

cont. on page 86

MICROPULSE
BTL6-V11V Rod BZ

With VARAN real-time industrial Ethernet

With the Micropulse BTL6-V11V Rod, Balluff is putting the first integrable position measuring system with VARAN real-time industrial Ethernet on the market. Micropulse rod-position measuring systems integrated in the pressure section of the hydraulic cylinder measure the current piston position directly.

cont. on page 88

MICROPULSE +
BTL7 Profile P

Position measurement in a demanding environment

Micropulse+ position measuring systems in a profile housing are non-contact, absolute measuring systems for accurately measuring one or more distances. They impress with their robust design including IP 67 high degree of protection, ease of installation, and wear-free measurement principle with high accuracy.

cont. on page 94

New

Flush-mounted BSP pressure sensors

Where standard sensors reach their limit

Balluff pressure sensors with a flush-mounted membrane are designed for media in which standard pressure sensors reach their limit. With their flush-mounted, welded stainless steel membrane, the sensors have no dead spaces and are particularly easy to clean.

cont. on page 102

BVS-E infrared vision sensors

Invisible means greater process reliability

Inspection and read processes for vision sensors can be impaired by changing ambient light. Simultaneously, employees and technicians are often bothered by the pulsing light of normal vision sensors.

cont. on page 114

Coaxial lighting

For highly reflective surfaces

Coaxial lighting is the optimal solution for lighting highly reflective surfaces. Therefore, coaxial lighting is well suited for transmitted light inspections of colored materials and for inspections of printed or dirty surfaces.

cont. on page 122

3D holder system for vision sensors

With unique quick-change plate

The 3D sensor holder with quick-change plate for industrial image processing from Balluff is a novelty on the market. Originally conceived for vision sensors, this multitalent can also hold other sensors of similar size.

cont. on page 124

Product Highlights
An overview

Flat backlighting with IP 69K

The correct light even in harsh environments

The new surface illuminator with the IP 69K high degree of protection is designed for difficult environments. Absolute water and dust density withstands even the highest loads of rough day-to-day work.

cont. on page 128

Industrial Ethernet cables

M12 & RJ45 cables and accesories

Available in multiple configurations and variations, these cables will satisfy your need for connecting to most EtherNet/IP, PROFINET, ETHERCAT or industrial Ethernet device in your network.

cont. on page 160

Universal IO-Link connector

Configurable I /O for simple control

In automation there is the need to control simple devices with basic I/O. Devices like pumps, signal lights, and much more are connected to the controls with the most basic discrete I/O. This connector allows you to connect to these devices and give them the advantages of IO-Link.

cont. on page 172

IP69K Cables with stainless steel nuts

M12 single and double ended

When washdown requirements are needed, the application demands stainless steel hex nuts and a high degree IP69K rating. These cables are flex rated to 2 million cycles and can resist up to 105 °C.

cont. on page 184

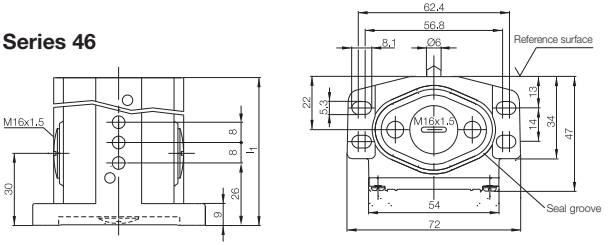
Object Detection

Mechanical Multiple Position Switches
Inductive Sensors
Photoelectric Sensors
Sensors for Pneumatic Cylinders
Capacitive Sensors
Ultrasonic Sensors

Stays cool, even when things get hot
The ultra-high temperature-proof multiple and single position switches can be used for temperatures up to 180 °C, require little space and feature a robust die casting housing. They are the perfect solution for harsh environments in die construction, plastic and steel industry.

Switch element BSE 79

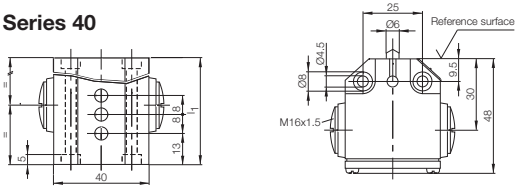
Series 46



Available sizes

Number of plungers	2	3
Dimension l_1	49 mm	59 mm

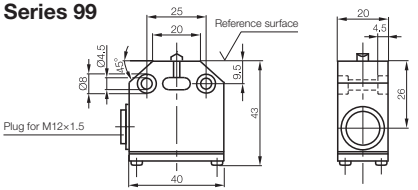
Series 40



Available sizes

Number of plungers	2	3
Dimension l_1	49 mm	59 mm

Series 99



For Extreme Applications up to +180 °C

Ultra-high temperature-resistant multiple and single position switches BNS

Ordering example:
BNS 819-B03-D08-46-15

BNS 819-B_ _-_ 08-_ _-15

No. of plungers	Plunger style	Model
02 2×	**D** Chisel	**40**
03 3×	**K** Ball	**46**
	R Roller	

Ordering example:
BNS 819-99-D-15

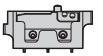
BNS 819-99-_ 15

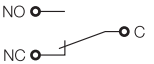
Plunger style

D	Chisel
K	Ball
R	Roller

Additional types on request
Contact Techincal Support at 1-800-543-8390.

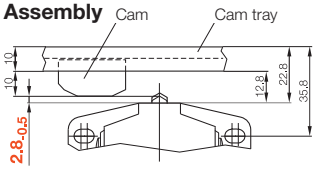
Type	Multiple and single position switches, 40, 46 and 99 series
Plunger spacing	8/10 mm
Plunger style	Chisel (**D**), Ball (**K**), Roller (**R**)
Plunger material	Stainless steel, contact surfaces induction-hardened
Housing material	Cast aluminum, corrosion-resistant, anodized finish
Connection type	M12×1.5 or M16×1.5 for bulkhead
Ambient temperature range	–5...150 °C (–5...180 °C 10 h/day) +23...302 °F (+23...356 °F 10 h/day)
Degree of protection per IEC 60529	IP 67





Switching element	**BSE 79**
Part number	BNS 819-...-46-15
Contact material	Gold
Switching principle	Snap switch
Contact system	Single-pin changeover
Connection type	Solder connection
Approval	UL, CE, CSA, CCC, ENEC
Plunger point to reference surface	4 mm
Switching point to reference surface	3.5 mm
Maximum plunger travel	3.5 mm
Switching actuating force on plunger	Min. 8 N

Assembly



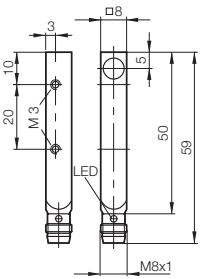
Important!
To ensure switching function, the dimension $2.8_{-0.5}$ is especially critical.

- Thanks to the miniature housing size, position sensing is now also possible where minimum space is required
- Assemblies can be shrunk even further, since the sensors require less space
- Ideal price/performance ratio
- Robust due to high-quality metal housing
- High functional reserve through increased switching distance

Size		**8×50×8 mm**
Mounting type		Flush
Rated switching distance s_n		**3 mm**
Switching distance identification		■■■
PNP	**Ordering code**	**BES01U4**
NO	Part number	BES Q08ZC-PSC30B-S49G
Supply voltage U_B		10...30 V DC
Rated operating current I_e		200 mA
Polarity reversal/short-circuit protected		yes/yes
Function indicator		yes
Ambient temperature		–25...+70 °C
Switching frequency f		1000 Hz
Degree of protection as per IEC 60529		IP 67
Approvals		CE, cULus
Housing material		Brass-coated
Material of sensing surface		PBT
Connection		M8 connector, 3-pin

Common application examples
- Linear units
- Machine position
- Part presence
- Robotics and automation
- Vibrating conveyor

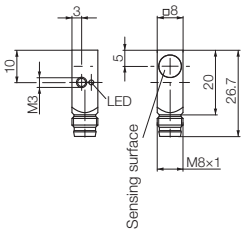
For installation instructions and connection circuit diagrams, see the catalog "Object detection – Inductive sensors".

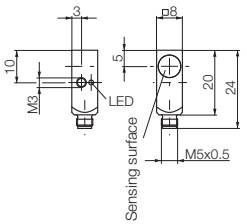


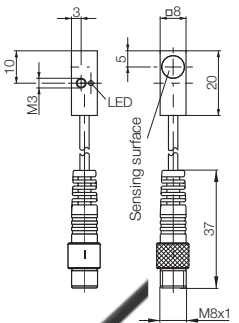
BES Inductive Sensors, 8×8 mm TripleProx and Shorties

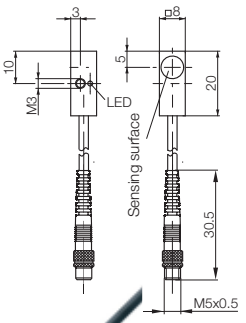
The sensors with the dream dimensions

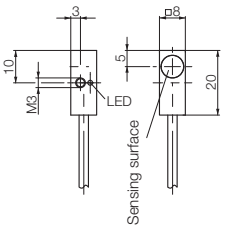
	8×27×8 mm	**8×24×8 mm**	**8×20×8 mm**	**8×20×8 mm**	**8×20×8 mm**
	Flush	Flush	Flush	Flush	Flush
	2 mm	**2 mm**	**2 mm**	**2 mm**	**2 mm**
	■■	■■	■■	■■	■■
	BES03Y8	**BES03U4**	**BES041N**	**BES041U**	**BES03U2**
	BES Q08MEC-PSC20B-S49G	BES Q08MEC-PSC20B-S26G	BES Q08MEC-PSC20B-EP00,3-GS49	BES Q08MEC-PSC20B-EP00,3-GS26	BES Q08MEC-PSC20B-EP02
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	200 mA	200 mA	200 mA	200 mA	200 mA
	yes/yes	yes/yes	yes/yes	yes/yes	yes/yes
	yes	yes	yes	yes	yes
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	3000 Hz	3000 Hz	3000 Hz	3000 Hz	3000 Hz
	IP 67	IP 67	IP 67	IP 67	IP 67
	CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus
	Brass-coated	Brass-coated	Brass-coated	Brass-coated	Brass-coated
	PBT	PBT	PBT	PBT	PBT
	M8 connector, 3-pin	M5 connector, 3-pin	0.3 m cable PUR with M8 connector, 3-pin	0.3 m cable PUR with M5 connector, 3-pin	2 m PUR cable, 3×0.14 mm²



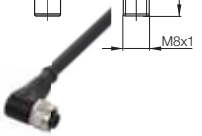
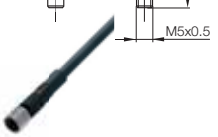








A large selection of plug connectors and connecting cables in different cable materials and lengths can be found in our catalog Industrial Networking and Connectivity.

Connector		**M8 × 1**	**M8 × 1**	**M5×0.5**	**M5×0.5**
Type		Straight female	Right angle female	Straight female	Right angle female
Cable length/material		2 m PUR	2 m PUR	3 m PUR	3 m PUR
No LED	**Ordering code**	**BCC02NU**	**BCC05OP**	**BCC0558**	**BCC00HM**
	Part number	BCC M313-0000-10-001-VX8334-020	BCC M323-0000-10-001-VX8334-020	BKS-B 25-1-PU-03	BKS-B 25-1-PU-03

Dimensions		
Mounting type		
Rated switching distance s_n		
PNP NO	**Ordering code**	
	Part number	
Supply voltage U_B		
Switching frequency f		
Housing/sensing surface material		
Degree of protection as per IEC 60529		
Connection		

Inductive Mini-sensors
Ultra-short housing

Small housing, low weight, and yet the highest switching precision Balluff mini-sensors fulfill these industrial automation requirements by means of small designs and peak performance, they offer great freedom of design and enable substantially more applications.

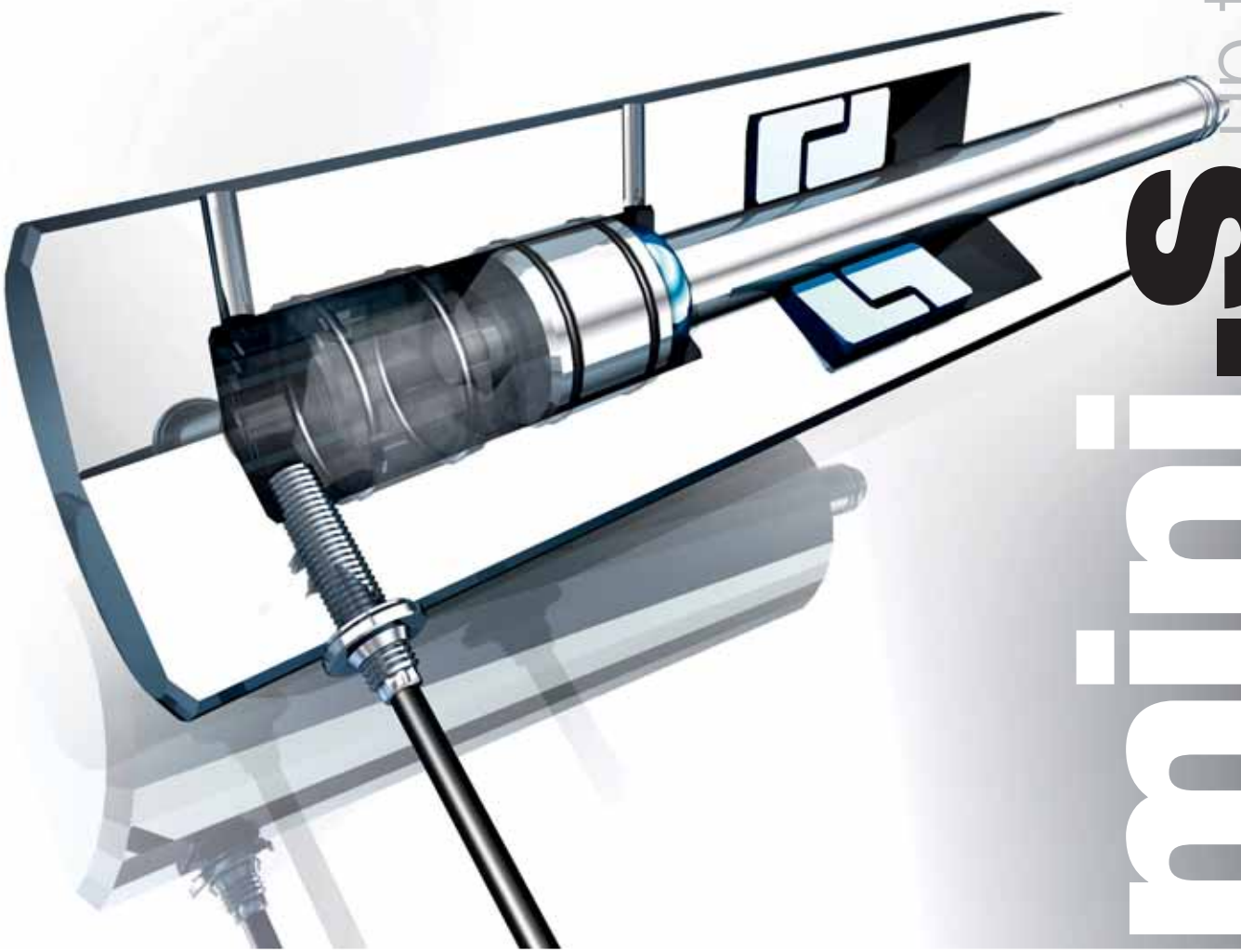
High-performance and compact
Balluff mini-sensor electronics are completely integrated, therefore they can be completely integrated in small application areas, such as linear units, valves, and actuators.
Their low weight enables applications with extremely fast accelerations, making them ideal for pick and place applications.

Inductive SuperShorty M12
The shortest inductive M12 on the market enables position sensing in applications where standard length sensors are simply too large.

- Short M12 Housing
- 4mm sn Flush
- 6mm sn Non-Flush
- M12 Connectors
- Stainless steel housing stand up in rugged applications
- 3 kHz frequency enables use of high speed applications

	Ø 6.5×6 mm	M8×10 mm	M12×12 mm	M12×17 mm
	Flush	Flush	Flush	Non-flush
	1.5 mm	1.5 mm	4 mm	6 mm
	BES0254	**BES0273**	**BES0464**	**BES047L**
	BES G06E60-PSC15B-EP00.3-GS49	BES M08EA-PSC15B-EP00.3-GS49	BES M12EA-PSC40B-EP00.3-GS04	BES M12EA-PSC60F-EP00.3-GS04
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	3 kHz	3 kHz	1 kHz	1 kHz
	Stainless steel/PBT	Stainless steel/PBT	Stainless steel/LCP	Stainless steel/LCP
	IP 67	IP 67	IP 67	IP 67
	0.3 m PUR cable with M8 plug, 3-pin	0.3 m PUR cable with M8 plug, 3-pin	0.3 m PUR cable with M12 plug, 3-pin	0.3 m PUR cable with M12 plug, 3-pin

- Mini design M5
- For pressure-resistant applications up to 100 bar
- Ideal price/performance ratio



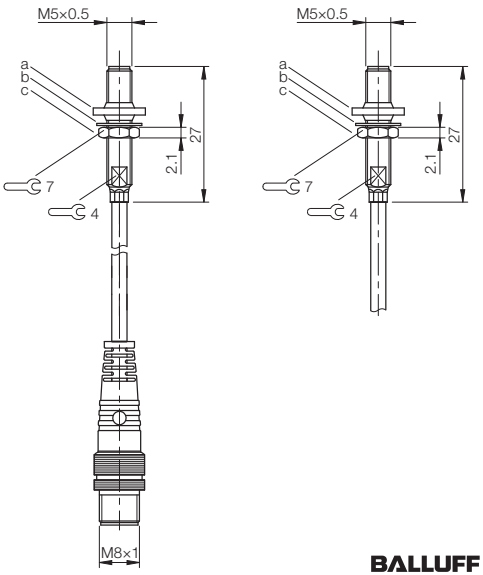
mini.S up to 100 bar

Pressure-resistant Inductive Mini Sensors

Powerful M5 sensors up to 100 bar

Size			**M5×0.5**	**M5×0.5**
Mounting type			Flush	Flush
Rated switching distance s_n			**0.8 mm**	**0.8 mm**
PNP	NO	**Ordering code**	**BES03LC**	**BES03L7**
		Part number	BES M05ED-PSD08B-BP00,3-GS49-R03	BES M05ED-PSD08B-BP02-R03
	NC	**Ordering code**	**BES03LE**	**BES03L8**
		Part number	BES M05ED-POD08B-BP00,3-GS49-R03	BES M05ED-POD08B-BP02-R03
NPN	NO	**Ordering code**	**BES03LF**	**BES03L9**
		Part number	BES M05ED-NSD08B-BP00,3-GS49-R03	BES M05ED-NSD08B-BP02-R03
	NC	**Ordering code**	**BES03LH**	**BES03LA**
		Part number	BES M05ED-NOD08B-BP00,3-GS49-R03	BES M05ED-NOD08B-BP02-R03
Supply voltage U_B			10...30 V DC	10...30 V DC
Rated operating current I_e			100 mA	100 mA
Reverse polarity protected			Yes	Yes
Short-circuit protected			Yes	Yes
Ambient temperature range			–25...+70 °C	–25...+70 °C
Sensor degree of protection per IEC 60529			IP 67	IP 67
Approvals			CE, cULus	CE, cULus
Housing material			Stainless steel	Stainless steel
Material of sensing face			Ceramic	Ceramic
Connection			0.3 m cable PUR with M8 connector, 3-pin	2 m cable PUR, 3×0.14 mm²
Pressure rated to			**100 bar**	**100 bar**

a) Sealing washer
b) Plain washer
c) Mounting nut
Included in the scope of delivery!



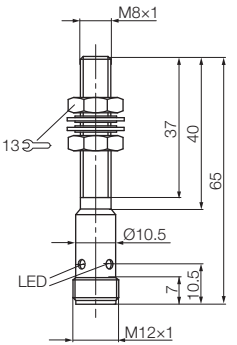
Application areas

- Coolant/lubricant sector
- Laboratories
- Low-pressure hydraulic systems
- Valves
- Pneumatic systems
- Industrial cleaning
- Special machine construction

F1+

- Greater switching distances for increased performance
- Saves time during installation because adjustments are minimized
- Perfectly suited for applications with variable detection objects (steel, AL, CuZn and Cu)

Size			**M8×1**
Mounting type			Flush
Rated switching distance s_n			**2 mm**
PNP	NO	**Ordering code**	**BES03YP**
		Part number	BES M08MG1-PSC20A-S04G-W
Supply voltage U_B			10...30 V DC
Rated operating current I_e			100 mA
Reverse polarity/short-circuit protected			Yes/yes
Ambient temperature range			–25...+70 °C
Switching frequency f			1000 Hz
Degree of protection per IEC 60529			IP 67
Approvals			CE, cULus
Housing material			Brass, PTFE coated
Material of sensing face			LCP
Connection			M12 connector, 3-pin, A-coded



Application areas

- Welding lines
- Lightweight construction
- Automobile suppliers
- Material handling technology
- Electric motors and electrical brakes
- Special machine construction

Weld Immune Factor 1+ Sensors

A plus for your application

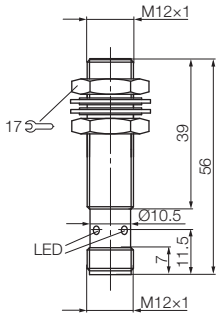
	M12×1
	Flush
	4 mm
	BES0452
	BES M12MG-PSC40A-S04G-W
	10...30 V DC
	200 mA
	Yes/yes
	–25...+70 °C
	2000 Hz
	IP 67
	CE, cULus
	Brass, PTFE coated
	PPS GF40
	M12 connector, 3-pin, A-coded

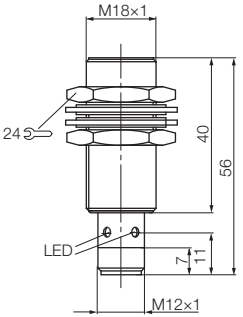
	M18×1
	Flush
	8 mm
	BES03YT
	BES M18MG-PSC80A-S04G-W
	10...30 V DC
	200 mA
	Yes/yes
	–25...+70 °C
	350 Hz
	IP 67
	CE, cULus
	Brass, PTFE coated
	PPS GF40
	M12 connector, 3-pin, A-coded

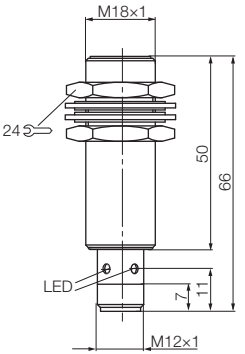
	M18×1
	Flush
	8 mm
	BES03YU
	BES M18MI-PSC80A-S04G-W
	10...30 V DC
	200 mA
	Yes/yes
	–25...+70 °C
	600 Hz
	IP 67
	CE, cULus
	Brass, PTFE coated
	PPS GF40
	M12 connector, 3-pin, A-coded

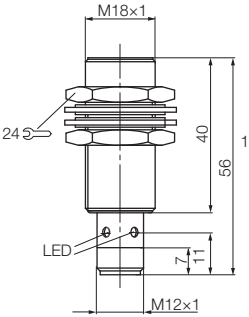
	M18×1
	Quasi-flush
	12 mm
	BES03YW
	BES M18MG-PSC12A-S04G-W
	10...30 V DC
	200 mA
	Yes/yes
	–25...+70 °C
	600 Hz
	IP 67
	CE, cULus
	Brass, PTFE coated
	PPS GF40
	M12 connector, 3-pin, A-coded

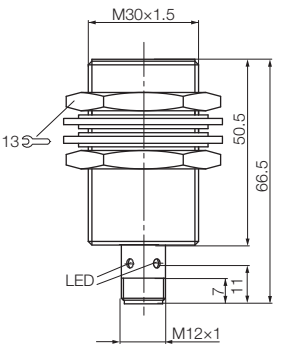
	M30×1.5
	Flush
	15 mm
	BES0454
	BES M30MI-PSC15A-S04G-W
	10...30 V DC
	200 mA
	Yes/yes
	–25...+70 °C
	250 Hz
	IP 67
	CE, cULus
	Brass, PTFE coated
	PPS GF40
	M12 connector, 3-pin, A-coded



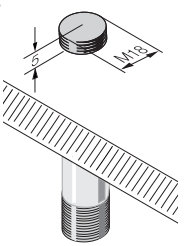








Installation in metal for **BES03YW** requires: Observe clear zone!



- Reduction in maintenance costs
- Increase in process quality

The ultra-high temperature-resistant inductive sensors can be used in temperature ranges up to +160 °C. Balluff ultra-high temperature sensors are ideally suited to harsh environments in the steel industry, in plastic injection molding machines and in forging and foundry processes.

CE

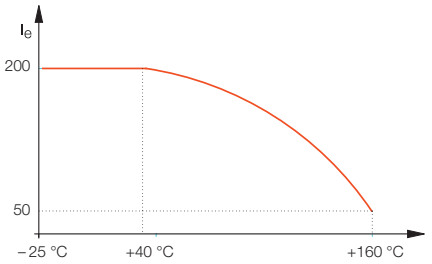
Size	
Mounting type	
Rated switching distance s_n	
PNP, NO **Ordering code**	
Part number	
Supply voltage U_B	
Voltage drop U_d at I_e	
Rated operating current I_e	
Ambient temperature range	
Switching frequency f	
Degree of protection per IEC 60529	
Housing material	
Sensing surface material	
Connection	

For Extreme Applications up to +160 °C

Ultra-high temperature-resistant inductive sensors

	M18×1	**M18×1**	**M30×1.5**	**M30×1.5**
	Flush	Non-flush	Flush	Non-flush
	5 mm	**8 mm**	**10 mm**	**15 mm**
	BES043T	**BES043U**	**BES043W**	**BES043Y**
	BES 515-326-SA49-D-TF-02	BES 515-360-SA13-D-TF-02	BES 515-327-SA22-D-TF-02	BES 515-362-SA4-D-TF-02
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	2.5 V	2.5 V	2.5 V	2.5 V
	200 mA	200 mA	200 mA	200 mA
	–25...+160 °C	**–25...+160 °C**	**–25...+160 °C**	**–25...+160 °C**
	200 Hz	200 Hz	200 Hz	200 Hz
	IP 69K	IP 69K	IP 69K	IP 69K
	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4571
	PEEK	PEEK	PEEK	PEEK
	2 m cable FEP, 3×0.34 mm²	2 m cable FEP, 3×0.34 mm²	2 m cable FEP, 3×0.34 mm²	2 m cable FEP, 3×0.34 mm²

Rated operating current



- Designed for wet and washdown conditions
- Resistant to aggressive cleaning agents
- Ecolab and FDA compliant
- Extended temperature ranges

Size		**Ø 12×50 mm**	**M12×50 mm**	**M12×45 mm**	**M12×65 mm**	**Ø 12×54.5 mm**	
Mounting type		Flush	Flush	Flush	Flush	Non-flush	
Rated switching distance s_n		**2 mm**	**2 mm**	**4 mm**	**4 mm**	**4 mm**	
PNP, NO	**Ordering code**	**BES0430**	**BES0444**	**BES0433**	**BES0435**	**BES0431**	
	Part number	BES G12EE1-PSY20B-S04G-L02	BES M12EE1-PSY20B-S04G-L01	BES M12EE-PSC40B-S04G-L01	BES M12EI-PSC40B-S04G-L01	BES G12EE1-PSY40F-S04G-L02	
PNP, NC	**Ordering code**			**BES0432**	**BES0434**		
	Part number			BES M12EE-POC40B-S04G-L01	BES M12EI-POC40B-S04G-L01		
NPN, NO	**Ordering code**				**BES0436**		
	Part number				BES M12EI-NSC40B-S04G-L01		
Supply voltage U_B		10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	
Voltage drop U_d at I_e		3.5 V	3.5 V	2 V	2.5 V	3.5 V	
Rated operating current I_e		130 mA*	130 mA*	200 mA	200 mA	130 mA*	
Reverse polarity/short-circuit protected		Yes/yes	Yes/yes	Yes/yes	Yes/yes	Yes/yes	
Ambient temperature range		–40...+105 °C	–40...+105 °C	–25...+85 °C	–25...+85 °C	–40...+105 °C	
Switching frequency f		800 Hz	800 Hz	2000 Hz	1000 Hz	400 Hz	
Approvals/conformity		CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	
Degree of protection		IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	
Housing material		Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4404	Stainless steel 1.4404	Stainless steel 1.4571	
Sensing surface material		PEEK	PEEK	LCP	LCP	PEEK	
Connection		M12 connector	M12 connector	M12 connector	M12 connector	M12 connector	

Stainless Steel | IP 68 as per BWN | IP 69K

FDA

ECOLAB

H_2O_2 resistant

Balluff offers a large selection of sensors for the food industry

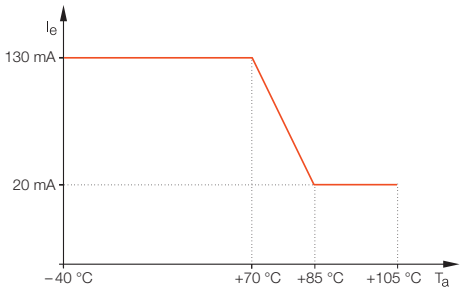
PROXI*NOX*

Sensors for the Food Industry

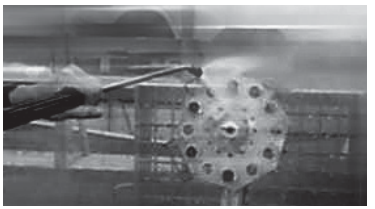
New inductive Proxinox sensors

	M12×54.5 mm	**Ø 18×45 mm**	**M18×45 mm**	**M18×65 mm**	**Ø 18×54.5 mm**	**M18×54.5 mm**
	Non-flush	Flush	Flush	Flush	Non-flush	Non-flush
	4 mm	**5 mm**	**5 mm**	**8 mm**	**8 mm**	**8 mm**
	BES0443	**BES0439**	**BES0441**	**BES0437**	**BES043A**	**BES0442**
	BES M12EE1-PSY40F-S04G-L01	BES G18EE1-PSY50B-S04G-L02	BES M18EE1-PSY50B-S04G-L01	BES M18EI-PSC80B-S04G-L01	BES G18EE1-PSY80F-S04G-L02	BES M18EE1-PSY80F-S04G-L01
				BES0438		
				BES M18EI-POC80B-S04G-L01		
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	3.5 V	3.5 V	3.5 V	2.5 V	3.5 V	3.5 V
	130 mA*	130 mA*	130 mA*	200 mA	130 mA*	130 mA*
	Yes/yes	Yes/yes	Yes/yes	Yes/yes	Yes/yes	Yes/yes
	–40...+105 °C	–40...+105 °C	–40...+105 °C	–40...+85 °C	–40...+105 °C	–40...+105 °C
	400 Hz	500 Hz	500 Hz	700 Hz	200 Hz	200 Hz
	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant	CE, cULus, Ecolab, FDA compliant
	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27	IP 69K and IP 68 per BWN Pr. 27
	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4571	Stainless steel 1.4404	Stainless steel 1.4571	Stainless steel 1.4571
	PEEK	PEEK	PEEK	PEEK	PEEK	PEEK
	M12 connector	M12 connector	M12 connector	M12 connector	M12 connector	M12 connector

***Current decrease curve**



Steam jet tested!



Compact sensor designs with large switching distances are required in material handling technology. In addition, the switching and operating state of the sensor can be identified with bright visible LEDs.

Housing optimized for material handling technology

- Highly visible corner LEDs
- Sensor head can be mounted in five positions
- Connector outlet set to position within a 270° range
- Factor 1
- Weld Immune
- Teflon-coated option

CE

Size		
Mounting type		
Rated switching distance s_n		
PNP NO	**Ordering code**	
	Part number	
Supply voltage U_B		
Rated operating current I_e		
Reverse polarity/short-circuit protected		
Ambient temperature range		
Switching frequency f		
Sensor degree of protection per IEC 60529		
Approvals		
Housing material		
Material of sensing face		
Connection		

Inductive Q40 Block Sensors with Corner LEDs

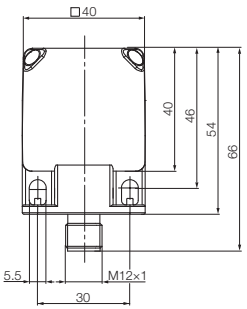
Optimized for material handling technology applications

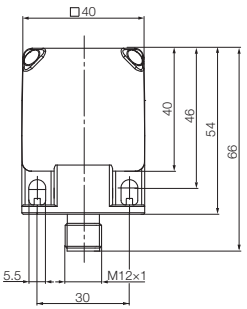
Factor 1
Magnetic field immune

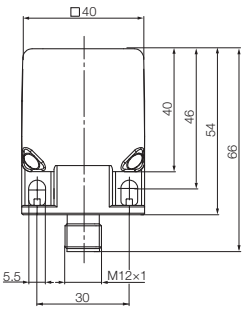
Factor 1
Magnetic field immune

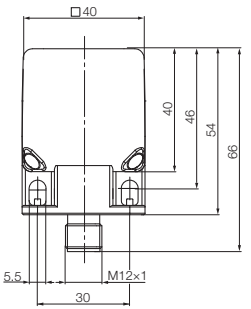
Factor 1
Magnetic field immune

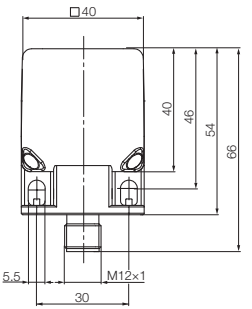
	40×40×66 mm	**40×40×66 mm**	**40×40×66 mm**	**40×40×66 mm**	**40×40×66 mm**
	Flush	Non-flush	Flush	Non-flush	Non-flush
	20 mm	**40 mm**	**20 mm**	**35 mm**	**40 mm**
	BES0306	**BES0308**	**BES0305**	**BES0307**	**BES0304**
	BES Q40KFU-PSC20B-S04G-012	BES Q40KFU-PSC40F-S04G-012	BES Q40KFU-PSC20A-S04G-012	BES Q40KFU-PSC35E-S04G-012	BES Q40KFU-PAC40E-S04G-012
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	200 mA	200 mA	200 mA	200 mA	200 mA
	Yes/yes	Yes/yes	Yes/yes	Yes/yes	Yes/yes
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	100 Hz	60 Hz	200 Hz	200 Hz	200 Hz
	IP 67	IP 67	IP 67	IP 67	IP 67
	CE, cULus	CE, cULus	CE, cULus	CE, cULus	CE, cULus
	PA	PA	PA	PA	PA
	PA	PA	PA Teflon coated	PA Teflon coated	PA Teflon coated
	M12 connector, 3-pin, A-coded	M12 connector, 3-pin, A-coded	M12 connector, 3-pin, A-coded	M12 connector, 3-pin, A-coded	M12 connector, 3-pin, A-coded











Inductive tube sensors complement the line of ring sensors. Optimized for tube infeeds in automated assembly, they detect small parts easily and reliably.

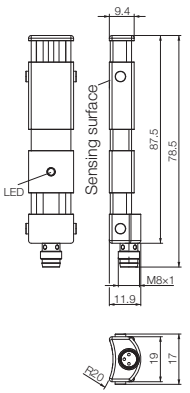
- Simple attachment to infeed tube
- Pulse extension of 150 ms results in a reliable detection of fast-moving parts
- Object speed max. 20 m/s

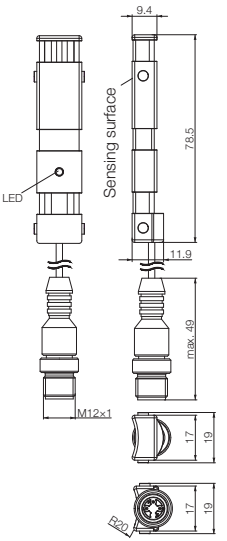
Inductive Tube Sensors BES Z06K

Fast and easy to install

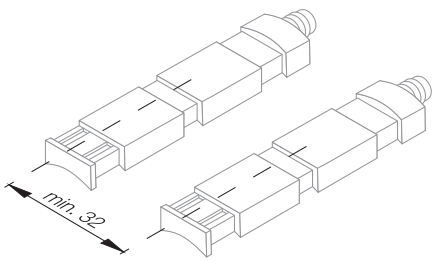
Size		17×78.5×11.9 mm	17×78.5×11.9 mm
Minimum object size		Screw M3×5	Screw M3×5
Rated switching distance s_n		16 mm	16 mm
PNP, NO	**Ordering code**	**BES0428**	**BES0429**
	Part number	BES Z06K-PSC16F-S49G	BES Z06K-PSC16F-BP00,1-GS04
Supply voltage U_B		10...30 V DC	10...30 V DC
Rated operating current I_e		200 mA	200 mA
Reverse polarity/short-circuit protected		Yes/yes	Yes/yes
Ambient temperature T_a		–25...+70 °C	–25...+70 °C
Function indicator		Yes	Yes
Degree of protection per IEC 60529		IP 67	IP 67
Housing material		PA 6.6	PA 6.6
Connection		M8 connector, 3-pin	M12 connector, 3-pin, A-coded with 0.1 m cable PUR
Pulse prolongation		150 ms	150 ms

Rated switching distance s_n based on FE360 steel plate (18×18×1 mm).





Centerline spacing for side-by-side mounting



- No alignment required because of one-piece construction
- Easy, fast installation and setup
- Reliable detection of transparent objects

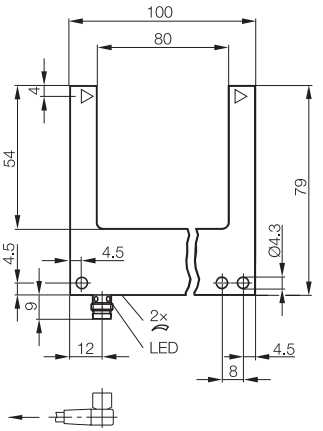
Reliable Transparency Detection

Now available with BGL laser fork sensors

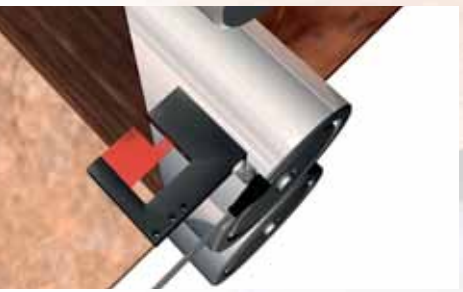
Maximum reliability –
Balluff BGL laser fork sensors ensure completely reliable detection of transparent objects.
These also provide the unsurpassed advantages offered by fork sensors: the transmitter and receiver do not need to be aligned. BGL laser fork sensors are therefore characterized by simple and fast commissioning as well as maximum reliability.

Ordering code / Part number		**BGL002T** BGL 80A-009-S49	**BGL002U** BGL 80A-010-S49
Switching output	PNP	■	
	NPN		■
Switching type	NC/NO selectable	■	■
Connection	M8 connector, 3-pin	■	■
Fork opening	80 mm	■	■
Light type		Laser	
Switching frequency		5000 Hz	
Degree of protection		IP 67	
Housing material		Gd-Zn	
Optical surface		Glass	

For additional information visit our website at **www.balluff.com**



- High degree of process reliability
- Track web movement
- Improved efficiency

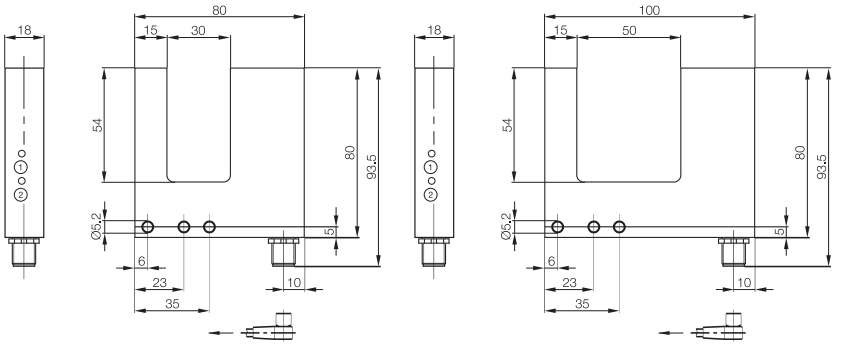


Reliable Web Edge Control
Analog BGL fork sensors

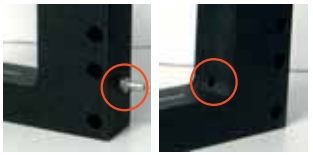
In-process correction
The light array on analog fork sensors not only ensures completely reliable detection, but also determines the position of objects with extreme accuracy: In-process correction could not be easier, process reliability and product quality are significantly improved.

Technical highlights
- Analog signal proportional to the light array blocked
- Stable value, even in the event of height variations
- Fieldbus connection with IO-Link

Ordering code / Part number		**BGL002Z** BGL 30C-001-S4	**BGL0037** BGL 50C-001-S4	**BGL0033** BGL 30C-005-S4	**BGL0031** BGL 30C-003-S4	**BGL003C** BGL 50C-005-S4	**BGL0039** BGL 50C-003-S4	**BGL0035** BGL 30C-007-S4	**BGL003F** BGL 50C-007-S4
Basic: 2 switching outputs		■	■						
Advanced: 1 analog output with 1 switching/error output				■	■	■	■		
Premium: IO-Link								on request	
Fork opening	30 mm	■		■	■			■	
	50 mm		■			■	■		■
Switching output	PNP	■	■	■	■	■	■	■	■
	NPN	on request							
Analog output	0...10 V DC			■		■			
	4...20 mA				■		■		
Light type		Red light							
Measurement field length		25 mm							
Resolution		≤ 0.1 mm							
Housing material		Al anodized							
Connection		M12 connector, 4-pin							

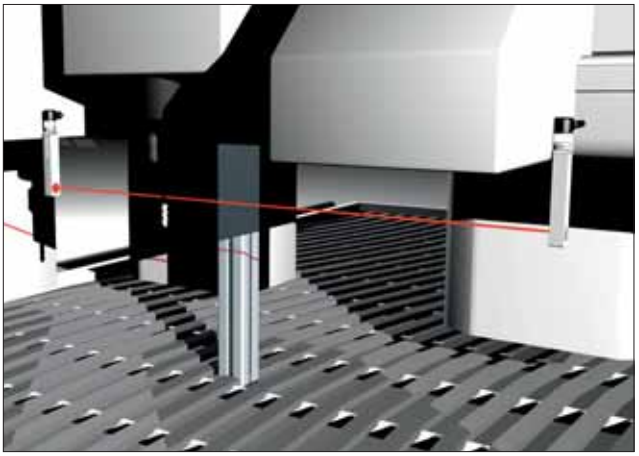


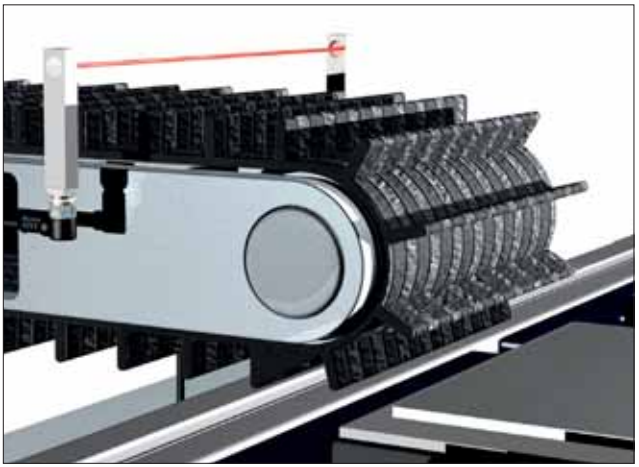
Integral air nozzle to prevent dust from accumulating on the optical transmitter and receiver.



Reliably detect the smallest parts
Balluff through-beam sensors BOS Q08M are innovative, compact products that provide high performance functionality. Nothing else produces comparable results under similar conditions. These sensors are therefore particularly recommended in space restricted applications. A focused light beam is able to detect even the smallest of parts, grooves or holes in a completely reliable manner. The high-performance, compact units are also characterized by the fact that their fine laser beam (PinPoint laser/red light) can be aligned very precisely in the middle of closely set parts to ensure reliable detection.

- Compact design for limited space
- Rugged metal housing
- Reliable detection of small parts up to 0.4 mm (PinPoint red light) or 0.28 mm (laser)
- Uses a patented mounting concept for Bosch profiles that allows quick, precise positioning





Red Light and Laser Through-beam Sensors BOS Q08M

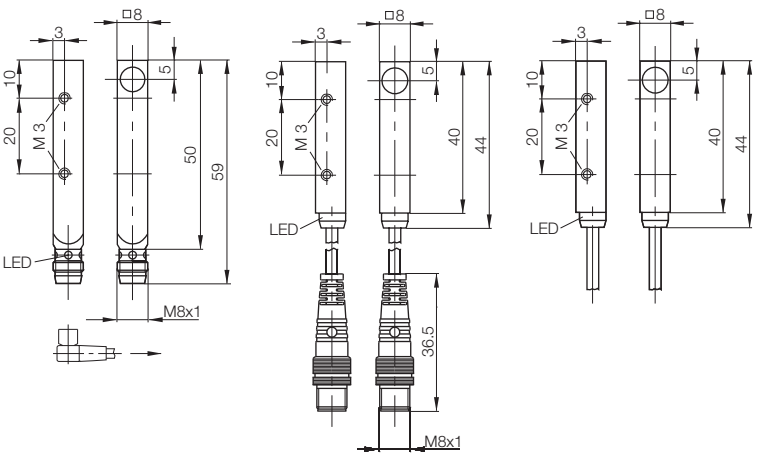
Extreme accuracy in a compact, high-performance design

PinPoint

Laser

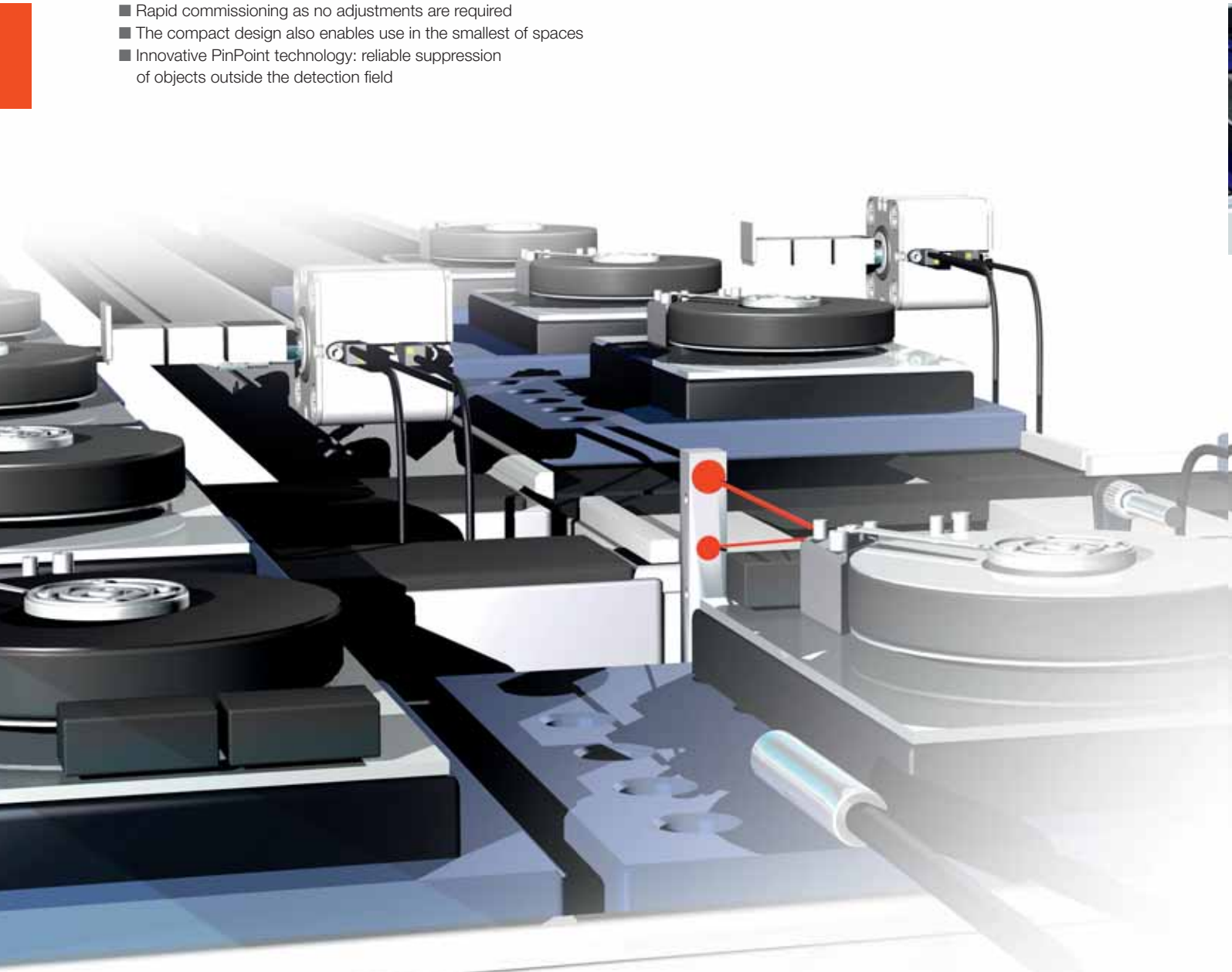
	Emitter				Receiver							Emitter			Receiver						
Ordering code	**BOS00YK**	**BOS00YH**	**BOS00YJ**		**BOS00YF**	**BOS00YC**	**BOS00YE**	**BOS00YA**	**BOS00Y8**	**BOS00Y9**		**BOS018K**	**BOS019M**	**BOS018M**	**BOS0199**	**BOS0197**	**BOS0198**	**BOS0196**	**BOS0194**	**BOS0195**	
Part number	BOS Q08M-X-KS20-S49	BOS Q08M-X-KS20-00,2-S49	BOS Q08M-X-KS20-02		BOS Q08M-PS-KE20-S49	BOS Q08M-PS-KE20-00,2-S49	BOS Q08M-PS-KE20-02	BOS Q08M-PO-KE20-S49	BOS Q08M-PO-KE20-00,2-S49	BOS Q08M-PO-KE20-02		BOS Q08M-X-LS20-S49	BOS Q08M-X-LS20-00,2-S49	BOS Q08M-X-LS20-02	BOS Q08M-PS-LE20-S49	BOS Q08M-PS-LE20-00,2-S49	BOS Q08M-PS-LE20-02	BOS Q08M-PO-LE20-S49	BOS Q08M-PO-LE20-00,2-S49	BOS Q08M-PO-LE20-02	
PNP					■	■	■	■	■	■					■	■	■	■	■	■	
NPN					on request										on request						
NO					■	■	■								■	■	■				
NC								■	■	■								■	■	■	
Connection M8 connector, 3-pin	■				■			■				■			■			■			
Cable with M8 connector, 3-pin		■				■			■				■			■			■		
Cable			■				■			■				■			■			■	
Range	0...2.2 m											0...3 m									
Light type	Red light (PinPoint LED)											Laser (laser class 1)									
Switching frequency	400 Hz											400 Hz									
Smallest detectable part	0.4 mm											0.28 mm									
Degree of protection	IP 67											IP 67									
Housing material	Nickel-plated Gd-Zn											Nickel-plated Gd-Zn									
Optical surface	PMMA											PMMA									

For additional information visit our website at **www.balluff.com**



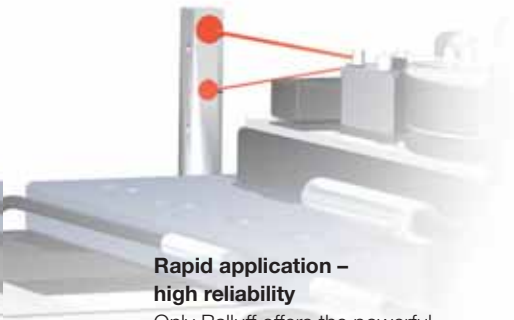
Clamp holder
For Bosch profile: **BES Q08-KH-3**

- Rapid commissioning as no adjustments are required
- The compact design also enables use in the smallest of spaces
- Innovative PinPoint technology: reliable suppression of objects outside the detection field



BOS Q08M Diffuse Sensor with Fixed Background Suppression

Quick installation



Rapid application – high reliability

Only Balluff offers the powerful combination of fixed background suppression and homogeneous red light through innovative PinPoint technology. And all of this is contained in a compact design, thereby enabling simple installation in even the most confined spaces.

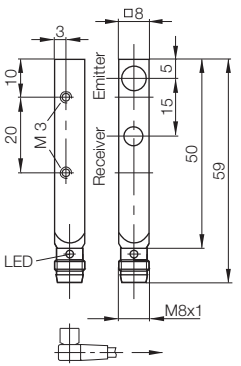
In addition, the sensors are ready for immediate use without any adjustment. A new, patented mounting concept also ensures flush installation in aluminum profiles.

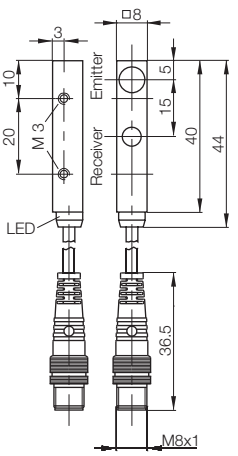
For Bosch profile:
BES Q08-KH-3

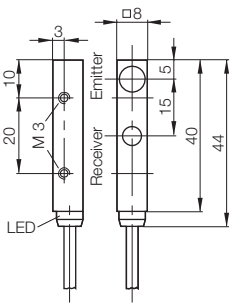
■ **Ordering code**
□ Part number

		Diffuse sensor					
		BOS0160 BOS Q08M-PS-KF20-S49	**BOS0163** BOS Q08M-PS-KF20-00,2-S49	**BOS0161** BOS Q08M-PS-KF20-02	**BOS0164** BOS Q08M-PO-KF20-S49	**BOS0168** BOS Q08M-PO-KF20-00,2-S49	**BOS0165** BOS Q08M-PO-KF20-02
Switching output	PNP	■	■	■	■	■	■
	NPN	on request					
Switching type	NO	■	■	■			
	NC				■	■	■
Connection	M8 connector, 3-pin	■			■		
	Cable with M8 connector, 3-pin		■			■	
	Cable			■			■
Sensing distance		5...50 mm					
Light type		Red light PinPoint LED					
Switching frequency		400 Hz					
Degree of protection		IP 67					
Housing material		Nickel-plated Gd-Zn					
Optical surface		PMMA					

For additional information visit our website at **www.balluff.com**

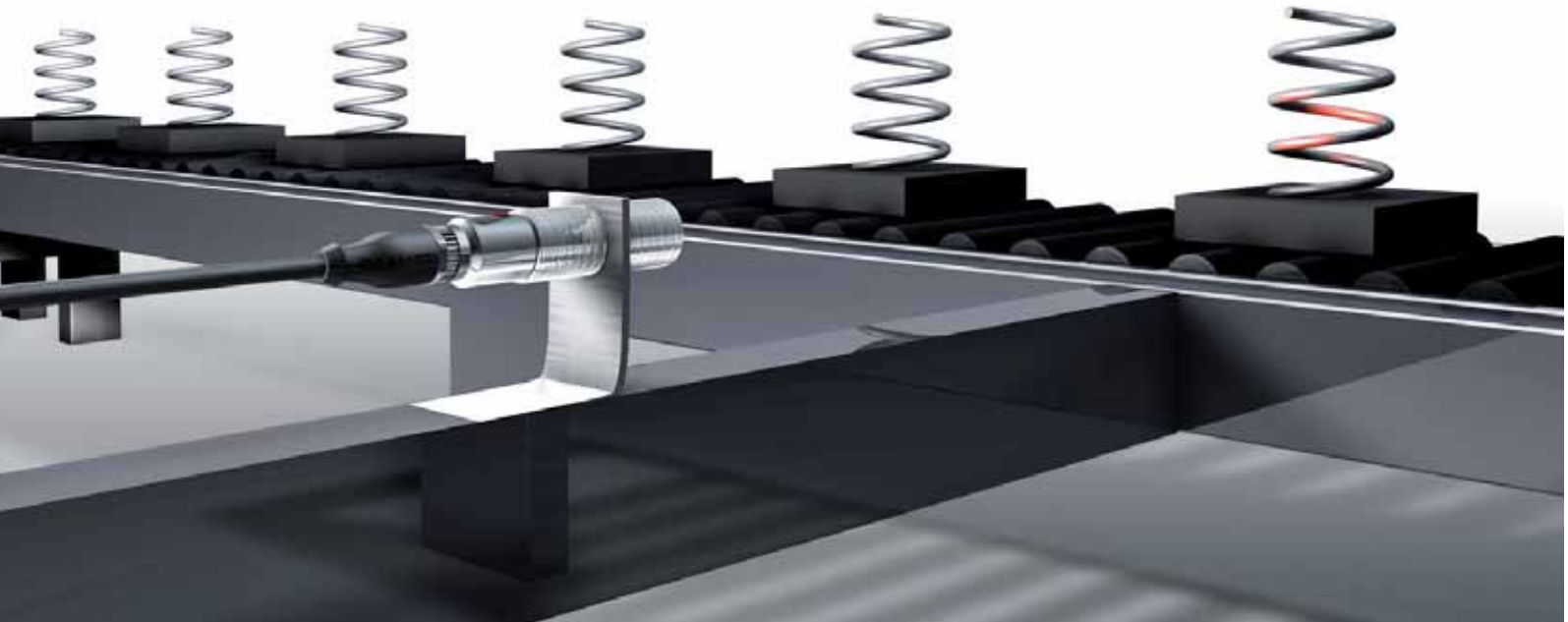






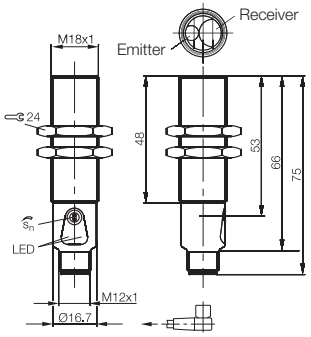
Balluff M18 laser diffuse sensors with background suppression are a genuine highlight. They are available with different light types, allowing you to simply select according to your requirements. The perfectly focused light beam is able to detect the smallest of parts, grooves or holes with maximum precision and reliability. The large light spot of the red light version with 300 mm is ideal for detecting objects with notches, holes or openings, because breakthroughs and free areas are simply bridged.
High-precision distinction between foreground and background at extremely short distances – the 150 mm red light version is ideal in this case.

- Color-independent object detection
- Precise setting with 10-turn potentiometer
- Robust M18 metal housing
- Universal fastening and alignment thanks to wide range of assembly accessories



Photoelectric Sensors M18

BOS 18M background suppression expertise



RedLight | Laser

CE | cULus LISTED

■ **Ordering code**
□ Part number

		Red light						Laser				
		BOS019N BOS 18M-PSV-RH22-S4	**BOS014W** BOS 18M-PA-RH22-S4	**BOS019T** BOS 18M-NA-RH22-S4	**BOS01J3** BOS 18M-NA-RH23-S4	**BOS01J2** BOS 18M-PSV-RH23-S4	**BOS01J4** BOS 18M-PA-RH23-S4	**BOS002K** BOS 18M-PSV-LH22-S4	**BOS002H** BOS 18M-PS-LH22-S4	**BOS001L** BOS 18M-NSV-RH22-S4	**BOS01C4** BOS 18M-PSV-LH23-S4	**BOS01C5** BOS 18M-PA-LH23-S4
Sensing distance		30...300 mm			30...150 mm			30...150 mm				
Gray value shift		low			very low			very low				
Light type	Red light	■	■	■	■	■	■					
	Laser							■	■	■	■	■
	Laser class							2	2	2	1	1
Switching output	PNP, antivalent		■				■					■
	PNP, NO	■				■		■	■		■	
	NPN, antivalent			■	■							
	NPN, NO									■		
Error output		■				■		■		■	■	
Optical surface		Glass						PMMA				
Housing material		Nickel-plated brass										
Supply voltage U_B		10...30 V DC										
Switching frequency		500 Hz										
Degree of protection (IEC 60529)		IP 67										
Ambient temperature T_a		–5...+55 °C										

Versions with NC contact upon request.

Accessories

- Clamping block BOS 18,0-KB-1
  with ball joint, plastic (ordering code: **BAM00T3**)
- Sensor holder BMS CS-P-D12-AD18-00 for Balluff mounting system,
  90° angle, plastic (ordering code: **BAM002P**)
- Sensor holder BMS CS-M-D12-ID18-01, for Balluff mounting system,
  90° angle, stainless steel (ordering code: **BAM0032**)
- Adjusting unit BMS AD-M-002-D12/D18 for Balluff mounting system,
  for fine adjustment (ordering code: **BAM0038**)
- Connector BCC M415-0000-1A-003-PX0434-020,
  M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.

- Superior performance and reliable object detection
- Ideal for standard applications, e.g. in automation
- Cost-effective alternative for all types of light
- Universal fastening thanks to wide range of assembly accessories

We often come across systems in which a sensor adjustment is not required, not possible or is undesirable. Our BOS-18M diffuse sensors and light barriers from the Global family are the correct choice for these applications. All of these sensors have a fixed setting. This shortens the time required for system commissioning and protects against manipulation. Equipped with a sound basic range of functions, these sensors also have the best possible price/performance ratio.

Global

Photoelectric Sensors M18

BOS 18M Global – reliable and cost-effective

	Diffuse sensor			Retroreflective sensor			Through-beam sensor				
Ordering code	**BOS01FA**	**BOS01FC**	**BOS01HL**	**BOS01F8**	**BOS01F9**	**BOS01HK**	**BOS01FE**	**BOS01FF**	**BOS01FH**	**BOS01HP**	**BOS01HM**
Part number	BOS 18M-PS-RD23-S4	BOS 18M-PO-RD23-S4	BOS 18M-PS-ID23-S4	BOS 18M-PS-PR23-S4	BOS 18M-PO-PR23-S4	BOS 18M-PS-IR23-S4	BOS 18M-PS-RE23-S4	BOS 18M-PO-RE23-S4	BOS 18M-X-RS23-S4	BOS 18M-PS-IE23-S4	BOS 18M-X-IS23-S4
Detection range	400 mm	400 mm	600 mm	4 m*	4 m*	6 m*	20 m	20 m	20 m	50 m	50 m
Light type – Red light	■	■		■	■		■	■	■		
Light type – Infrared			■			■				■	■
Switching output – PNP, NO	■		■	■		■	■			■	
Switching output – PNP, NC		■			■			■			
Switching output – Emitter									■		■
Polarizing filter				■	■						
Supply voltage U_B	10...30 V DC										
Switching frequency	400 Hz										
Housing material	Nickel-plated brass										
Optical surface	Glass										
Type of protection (IEC 60529)	IP 67										
Ambient temperature T_a	–5...+55°C										

* based on reflector BOS R-1

Accessories

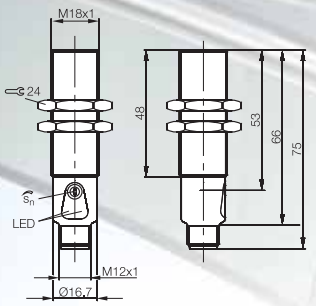
- BOS R-1 reflector, circular, Ø 84 mm (Ordering code: **BAM00UK**)
- Reflector BOS R-9, 50x50 mm (ordering code: **BAM00WL**)
- BOS 18.0-KB-1 clamping block, with ball joint, plastic (Ordering code: **BAM00T3**)
- Fastening nuts (2 required) 6KTMU M18X1-MS (Ordering code: **500152**)
- BES 18.0-BS-1 mounting clamp, plastic (Ordering code: **BAM00F2**)
- BES 18-HW-1 retaining bracket, angle for surface mounting 90°, aluminum (Ordering code: **BAM00EY**)
- Sensor holder BMS CS-P-D12-AD18-00, for Balluff assembly system, 90° angle, plastic (ordering code: **BAM002P**)
- Sensor holder BMS CS-M-D12-ID18-01, for Balluff assembly system, 90° angle, stainless steel (ordering code: **BAM0032**)
- Connector BCC M415-0000-1A-003-PX0434-020, M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.
Please order mounting accessories separately.

- Simple, fast installation
- Long ranges
- Highly visible red light
- Precise switching response

Precise switching response – excellent repeat accuracy
Cutting-edge LED technology and the latest Fresnel lenses are combined in this unit to form an innovative and powerful photoelectric sensor. What this means in practice: Improved repeat accuracy and precise switching even at large distances.

Technical highlights
- Long operating range
- Rugged M18 metal housing
- State-of-the-art LED technology with sharply contoured light spot



Photoelectric Red Light Sensors M18

For maximum precision

■ **Ordering code**
□ Part number

		BOS01CA BOS 18M-PA-RD21-S4	**BOS01E7** BOS 18M-PS-RD21-S4	**BOS01E8** BOS 18M-PO-RD21-S4	**BOS01CF** BOS 18M-PA-RD20-S4	**BOS01C1** BOS 18M-PS-RD20-S4	**BOS01E3** BOS 18M-PO-RD20-S4	**BOS01CE** BOS 18M-PA-PR20-S4	**BOS01C3** BOS 18M-PS-PR20-S4	**BOS01CZ** BOS 18M-PO-PR20-S4	**BOS01C0** BOS 18M-X-RS20-S4	**BOS01EP** BOS 18M-XT-RS20-S4	**BOS01CC** BOS 18M-PA-RE20-S4	**BOS01C2** BOS 18M-PS-RE20-S4	**BOS01EE** BOS 18M-PO-RE20-S4
Type	Diffuse sensor energetic	■	■	■	■	■	■								
	Retroreflective sensor							■	■	■					
	Through-beam emitter										■				
	Through-beam emitter with test input											■			
	Through-beam receiver												■	■	■
Switching output	PNP, antivalent	■			■			■							
	PNP, NO		■			■			■					■	
	PNP, NC			■			■			■					■
Sensing range	30…300 mm														
	1...300 mm	■	■	■											
	1...600 mm				■	■	■								
	0.1...7 m							■	■	■					
	0...20 m										■	■	■	■	■
Switching frequency	400 Hz	■	■	■	■	■	■	■	■	■			■	■	■
Setting		270° potentiometer													
Light type		Red light													
Housing material		Nickel-plated brass													
Connection		M12 connector, 4-pin													

NPN versions on request.

Accessories

– Reflector BOS R-1 (ordering code: **BAM00UK**)
– Straight connector, 2 m PUR, other lengths on request
BCC M415-0000-1A-003-PX0434-020 (ordering code: **BCC032F**)
– Right-angle connector, 2 m PUR, other lengths on request
BCC M425-0000-1A-003-PX0434-020 (ordering code: **BCC032Y**)
Further accessories upon request.

- Reliable object detection even in a contaminated environment
- Invisible light – does not irritate personnel
- Simple and fast setting with potentiometer
- Through-beam sensor with test input for function control
- Wide range of assembly accessories

The successful BOS 18M series now includes invisible infrared light. This type of light demonstrates its advantages particularly in heavily contaminated production environments: Objects are reliably detected unimpeded by dust or dirt. With its range of more than100 meters, the high-power version of the through-beam sensor impresses particularly in this area. The standardized design of all BOS 18Ms permits a simple change between the different types of light – without assembly change.

Photoelectric Infrared Sensors M18

BOS 18M infrared – invisible power

Ordering code
Part number

	Diffuse sensor			Retroreflective sensor							Through-beam sensor							
	BOS01EY	BOS 18M-PA-ID20-S4	**BOS01EZ**	BOS 18M-NA-ID20-S4	**BOS01F0**	BOS 18M-PA-IR20-S4	**BOS01F1**	BOS 18M-PS-IR20-S4	**BOS01F2**	BOS 18M-NA-IR20-S4	**BOS01HR**	BOS 18M-PA-IR21-S4	**BOS01HW**	BOS 18M-NA-IR21-S4	**BOS01F3**	BOS 18M-PA-IE20-S4	**BOS01F4**	BOS 18M-NA-IE20-S4	**BOS01F5**	BOS 18M-X-IS20-S4	**BOS01HN**	BOS 18M-XT-IS20-S4	**BOS01HT**	BOS 18M-X-IS24-S4	**BOS01HU**	BOS 18M-XT-IS24-S4
Detection range	800 mm				10 m*						7 m*				depending on emitter				50 m				100 m			
Light type	PNP	■			■		■				■				■											
	NPN			■					■				■				■									
Switching output	antivalent	■		■	■				■		■		■		■		■									
	NO						■																			
	Emitter																		■		■		■		■	
	Test input																				■				■	
Polarizing filter											■		■													
Supply voltage U_B	10...30 V DC																									
Switching frequency	400 Hz																									
Housing material	Nickel-plated brass																									
Optical surface	Glass																									
Degree of protection (IEC 60529)	IP 67																									
Ambient temperature T_a	–5...+55 °C																									

* based on reflector BOS R-1

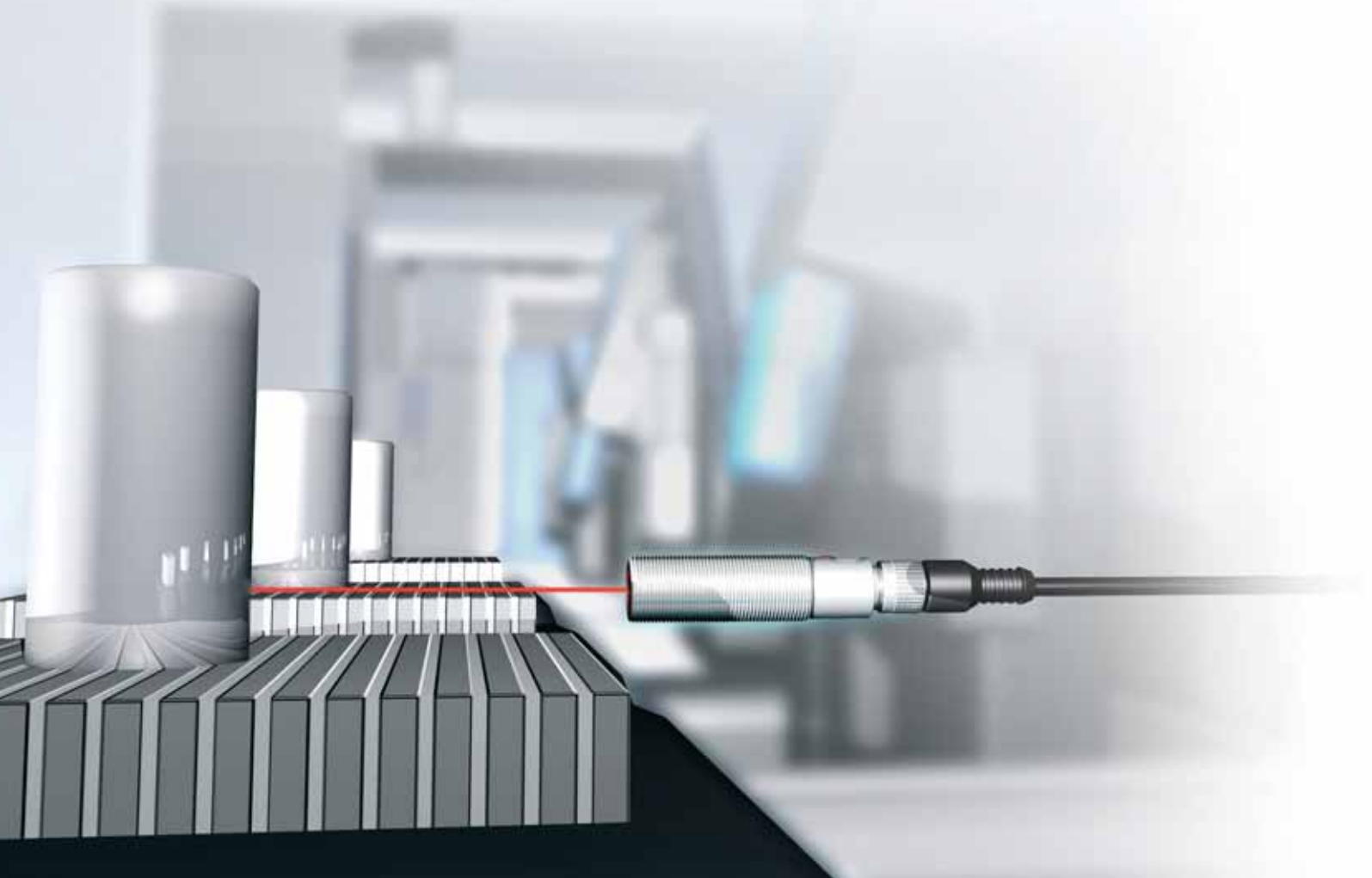
Accessories

- Reflector BOS R-1, circular, dia. 84 mm (ordering code: **BAM00UK**)
- Reflector BOS R-9, 50x50 mm (ordering code: **BAM00WL**)
- Clamping block BOS 18,0-KB-1, with ball joint, plastic (ordering code: **BAM00T3**)
- Mounting clamp BES 18,0-BS-1, plastic (ordering code: **BAM00F2**)
- Retaining bracket BES 18-HW-1, angle for surface assembly 90°, aluminum (ordering code: **BAM00EY**)
- Sensor holder BMS CS-P-D12-AD18-00, for Balluff mounting system, 90° angle, plastic (ordering code: **BAM002P**)
- Sensor holder BMS CS-M-D12-ID18-01, for Balluff mounting system, 90° angle, stainless steel (ordering code: **BAM0032**)
- Connector BCC M415-0000-1A-003-PX0434-020, M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.

- Continuous sensor monitoring of contamination and malfunctions
- Switchable output
- Simple teach-in procedure
- Standardized BOS-18M design for fast sensor change

For users who prefer the teach-in procedure for sensor setting, Balluff now offers its successful red light series BOS 18M, with long ranges, precise switching behavior and very high levels of repeat accuracy. The top sensor in its class is quickly set at the push of a button.



Photoelectric Sensor with Teach-In

BOS 18M Teach-in

		Diffuse sensor (energetic)		Retro-reflective sensor		Through-beam sensor		
Ordering code		**BOS01CU**	**BOS01J8**	**BOS01CT**	**BOS01J9**	**BOS01CW**	**BOS01J7**	**BOS01CY**
Part number		BOS 18M-PUD-RD30-S4	BOS 18M-PUV-RD30-S4	BOS 18M-PUD-PR30-S4	BOS 18M-PUV-PR30-S4	BOS 18M-PUD-RE30-S4	BOS 18M-PUV-RE30-S4	BOS 18M-X-RS30-S4
Detection range		500 mm		5 m*		20 m		
Switching type	NC/NO selectable	■	■	■	■	■	■	
	Emitter							■
Separate contamination output			■		■		■	
Polarizing filter				■	■			
Switching frequency		200 Hz	1 kHz	200 Hz	1 kHz	200 Hz	1 kHz	
Supply voltage U_B		10...30 V DC						
Housing material		Nickel-plated brass						
Optical surface		Glass						
Degree of protection (IEC 60529)		IP 67						
Ambient temperature T_a		–5...+55 °C						

* based on reflector BOS R-1

Accessories

- Reflector BOS R-1, circular, dia. 84 mm (ordering code: **BAM00UK**)
- Reflector BOS R-9, 50x50 mm (ordering code: **BAM00WL**)
- Clamping block BOS 18,0-KB-1, with ball joint, plastic (ordering code: **BAM00T3**)
- Mounting clamp BES 18,0-BS-1, plastic (ordering code: **BAM00F2**)
- Retaining bracket BES 18-HW-1, angle for surface assembly 90°, aluminum (ordering code: **BAM00EY**)
- Sensor holder BMS CS-P-D12-AD18-00, for Balluff mounting system, 90° angle, plastic (ordering code: **BAM002P**)
- Sensor holder BMS CS-M-D12-ID18-01, for Balluff mounting system, 90° angle, stainless steel (ordering code: **BAM0032**)
- Connector BCC M415-0000-1A-003-PX0434-020, M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.

Photoelectric Sensors M18

BOS 18M infrared diffuse sensor – especially for glass detection

- Special optics enable glass detection, low blind zones, and high ambient light security
- Secure detection of solar modules in production (typical distance 2...25 mm)
- Scanning glass detection (typical distance 2...40 mm)
- Secure detection of high-gloss surfaces over a wide angular range
- Suppression of objects in the background starting at 250 mm

The detection of glass always poses a special challenge for photoelectric sensors. Often, a retroreflective sensor cannot be installed, so detection by means of a diffuse sensor is the only option. For this, Balluff now also provides a solution within the successful BOS 18M model line. The special optics of the sensor ensure that glass surfaces, for example in solar modules, can be reliably detected.
But the sensor's strengths also come into play in a totally different area: with high-gloss objects. These are reliably detected from all directions over a large angular range.

Additionally, the sensor is extremely insensitive to ambient light and can even suppress objects in the background.

Diffuse sensor energetic

Ordering code		BOS01J1
Part number		BOS 18M-PS-ID24-S4
Switching output	PNP normally open	■
Sensing range	Glass	2...40 mm
	Solar module	2...25 mm
	Gray chart 90%	2...80 mm
Switching frequency		200 Hz
Setting		none
Light type		Infrared
Housing material		Nickel-plated CuZn
Optical surface		PMMA
Connection		M12 connector, 4-pin
Ambient temperature T_a		–5...+55 °C

Accessories

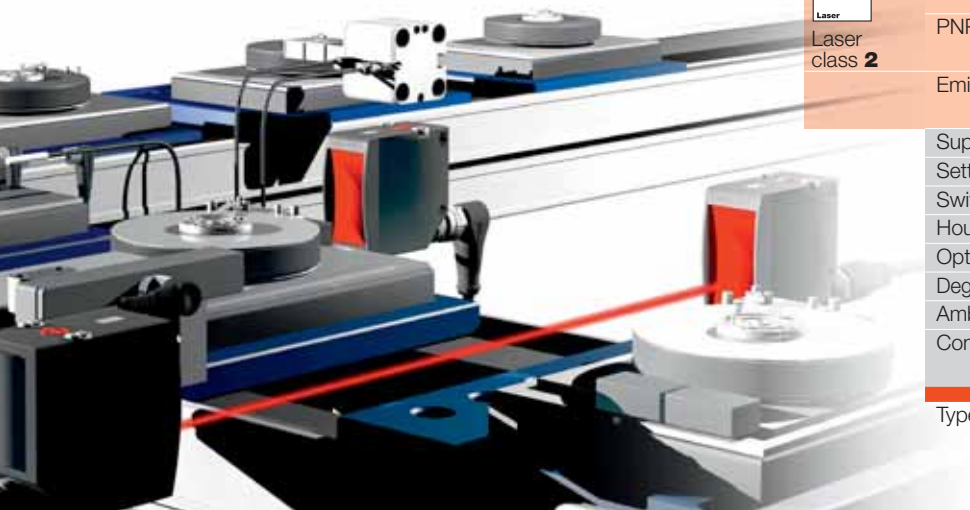
– BOS 18.0-KB-1 clamping block, with ball joint, plastic (ordering code: **BAM00T3**)
– BES 18.0-BS-1 mounting clamp, plastic (ordering code: **BAM00F2**)
– BES 18-HW-1 retaining bracket, angle for surface assembly 90°, aluminum (ordering code: **BAM00EY**)
– Sensor holder BMS CS-P-D12-AD18-00, for Balluff assembly system, 90° angle, plastic (ordering code: **BAM002P**)
– Sensor holder BMS CS-M-D12-ID18-01, for Balluff assembly system, 90° angle, stainless steel (ordering code: **BAM0032**)
– Connector BCC M415-0000-1A-003-PX0434-020, M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.

- Accurate switching characteristics for precision positioning tasks
- Long ranges and compact design for greater freedom of system design
- Highly visible red light/laser light for precision alignment
- LEDs visible from all sides
- Multiple mounting options
- Laser versions ideal for small part detection
- Outstanding price/performance ratio

Accessories

- Reflector for red light variants BOS R-1 (ordering code: **BAM00UK**)
- Reflector for laser variants BOS R-22 (ordering code: **BAM00UY**)
- Lens protector BAM PC-XO-006-23K-1 (ordering code: **BAM01L8**)
- Mounting bracket BMS CS-M-D12-B23K-05 (ordering code: **BAM01AW**)
- Straight connector, 2 m PUR, other lengths on request BCC M415-0000-1A-003-PX0434-020 (ordering code: **BCC032F**)



Type			
LED red light	Detection range		
	PNP Antivalent	**Ordering code**	
		Part number	
	PNP NC/NO selection	**Ordering code**	
		Part number	
	Emitter	**Ordering code**	
		Part number	
	Supply voltage U_B		
	Setting		
	Switching frequency		
	Housing material		
	Optical surface		
	Degree of protection per IEC 60529		
	Ambient temperature T_a		
	Connection		

Laser class **1** / Laser class **2**	Detection range		
	PNP Antivalent	**Ordering code**	
		Part number	
	PNP NC/NO selection	**Ordering code**	
		Part number	
	PNP Antivalent	**Ordering code**	
		Part number	
	PNP NC/NO selection	**Ordering code**	
		Part number	
	Emitter	**Ordering code**	
		Part number	
	Supply voltage U_B		
	Setting		
	Switching frequency		
	Housing material		
	Optical surface		
	Degree of protection per IEC 60529		
	Ambient temperature T_a		
	Connection		

Types with NPN upon request.

New Photoelectric Sensors BOS 23K

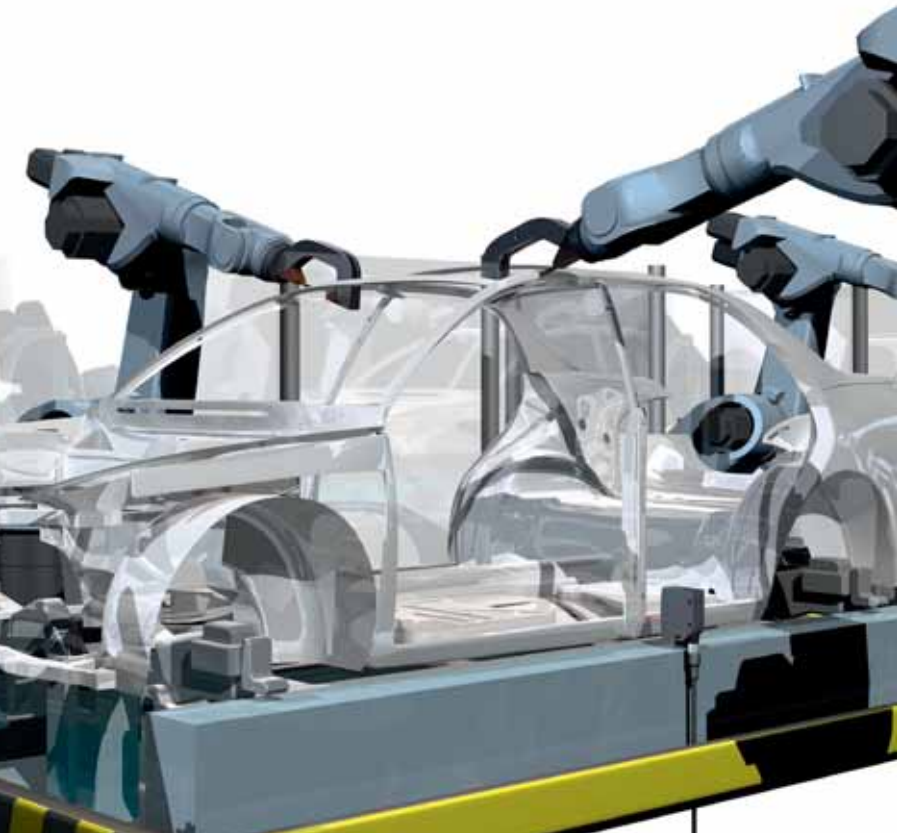
Red light and laser provide a competitive edge

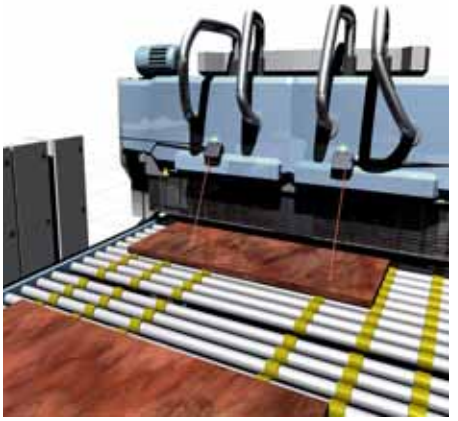
	Diffuse sensor	Diffuse sensor with background suppression	Retroreflective sensor	Through-beam sensor Receiver	Through-beam sensor Emitter
	0...2 m	**0...1.2 m**	**0...14 m**	**0...25 m**	**0...25 m**
	BOS01FM	**BOS01FL**	**BOS01FN**	**BOS01FP**	
	BOS 23K-PA-RD10-S4	BOS 23K-PA-RH10-S4	BOS 23K-PA-RR10-S4	BOS 23K-PA-RE10-S4	
	BOS016Z	**BOS0178**	**BOS016P**	**BOS016F**	
	BOS 23K-PU-RD10-S4	BOS 23K-PU-RH10-S4	BOS 23K-PU-RR10-S4	BOS 23K-PU-RE10-S4	
					BOS016E
					BOS 23K-XT-RS11-S4
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	Teach-in	18-turn potentiometer	Teach-in	Teach-in	Teach-in
	600 Hz	600 Hz	600 Hz	500 Hz	
	ABS	ABS	ABS	ABS	ABS
	PMMA	PMMA	PMMA	PMMA	PMMA
	IP 69K	IP 69K	IP 69K	IP 69K	IP 69K
	–20...+60 °C	–20...+60 °C	–20...+60 °C	–20...+60 °C	–20...+60 °C
	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

	0...1.2 m	**0...1.2 m**	**0...14 m**	**0...30 m**	**0...30 m**
		BOS01FR	**BOS01HJ**	**BOS01FU**	
		BOS 23K-PA-LH10-S4	BOS 23K-PA-LR10-S4	BOS 23K-PA-LE10-S4	
		BOS017C	**BOS016U**	**BOS016L**	
		BOS 23K-PU-LH10-S4	BOS 23K-PU-LR10-S4	BOS 23K-PU-LE10-S4	
		BOS01FT			
		BOS 23K-PA-LH20-S4			
	BOS0175	**BOS017H**			
	BOS 23K-PU-LD20-S4	BOS 23K-PU-LH20-S4			
					BOS 016K
					BOS 23K-XT-LS11-S4
	10…30 V DC	12…30 V DC	10…30 V DC	10…30 V DC	10…30 V DC
	Teach-in	18-turn potentiometer	Teach-in	Teach-in	Teach-in
	600 Hz	1 kHz	2 kHz	3.5 kHz	
	ABS	ABS	ABS	ABS	ABS
	PMMA	PMMA	PMMA	PMMA	PMMA
	IP 69K	IP 69K	IP 69K	IP 69K	IP 69K
	–20…+60°C	–20…+60°C	–20…+60°C	–20…+60°C	–20…+60°C
	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

- Reliable object detection even at long distances
- Real background suppression up to 2 m sensing range even on dark objects
- Simple alignment due to bright, clearly visible beam spot
- Simple and fast setting with potentiometer
- Through-beam sensor with test input for function control
- Varied and timesaving assembly options

The new light barriers and diffuse sensors in the BOS 50K series combine top performance and compact dimensions. Thanks to their long range, these sensors are suitable for use in numerous sectors: From the automobile industry to the woodworking industry. The background suppression, in particular, impresses with an almost color-independent detection of objects – and at maximum sensing range.





CE

Type			

Detection range			
PNP	Antivalent	**Ordering code**	
		Part number	
PNP	NO	**Ordering code**	
		Part number	
PNP	NO with	**Ordering code**	
	fault output	Part number	
	Emitter with	**Ordering code**	
	test input	Part number	
	Emitter without	**Ordering code**	
	test input	Part number	
Gray value shift			
Supply voltage U_B			
Setting			
Switching frequency			
Housing material			
Optical surface			
Degree of protection per IEC 60529			
Ambient temperature T_a			
Connection			

Types with PNP NC contact and NPN upon request

Photoelectric Sensors BOS 50K

Even longer ranges with red light

	Diffuse sensor with background suppression	Diffuse sensor	Retroreflective sensor with polarized light	Through-beam sensor Receiver	Through-beam sensor Emitter
	200...2000 mm	**1...2000 mm**	**0.1...18 m***	**0...60 m**	
	BOS018P	**BOS01CJ**	**BOS01CR**	**BOS01CK**	
	BOS 50K-PA-RH12-S4	BOS 50K-PA-RD10-S4	BOS 50K-PA-PR10-S4	BOS 50K-PA-RE10-S4	
	BOS018N	**BOS01CP**	**BOS01CL**	**BOS01CM**	
	BOS 50K-PS-RH12-S4	BOS 50K-PS-RD10-S4	BOS 50K-PS-PR10-S4	BOS 50K-PS-RE10-S4	
	BOS0156				
	BOS 50K-PSV-RH12-S4				
					BOS01CN
					BOS 50K-XT-RS10-S4
					BOS01EU
					BOS 50K-X-RS10-S4
	< 10 %				
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	10-turn potentiometer	Potentiometer 270°	Potentiometer 270°		Potentiometer 270°
	500 Hz	400 Hz	400 Hz	400 Hz	400 Hz
	PC/ABS	PC/ABS	PC/ABS	PC/ABS	PC/ABS
	Glass	Glass	Glass	Glass	Glass
	IP 67	IP 67	IP 67	IP 67	IP 67
	–5...+55 °C	–5...+55 °C	–5...+55 °C	–5...+55 °C	–5...+55 °C
	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

* based on reflector R-1

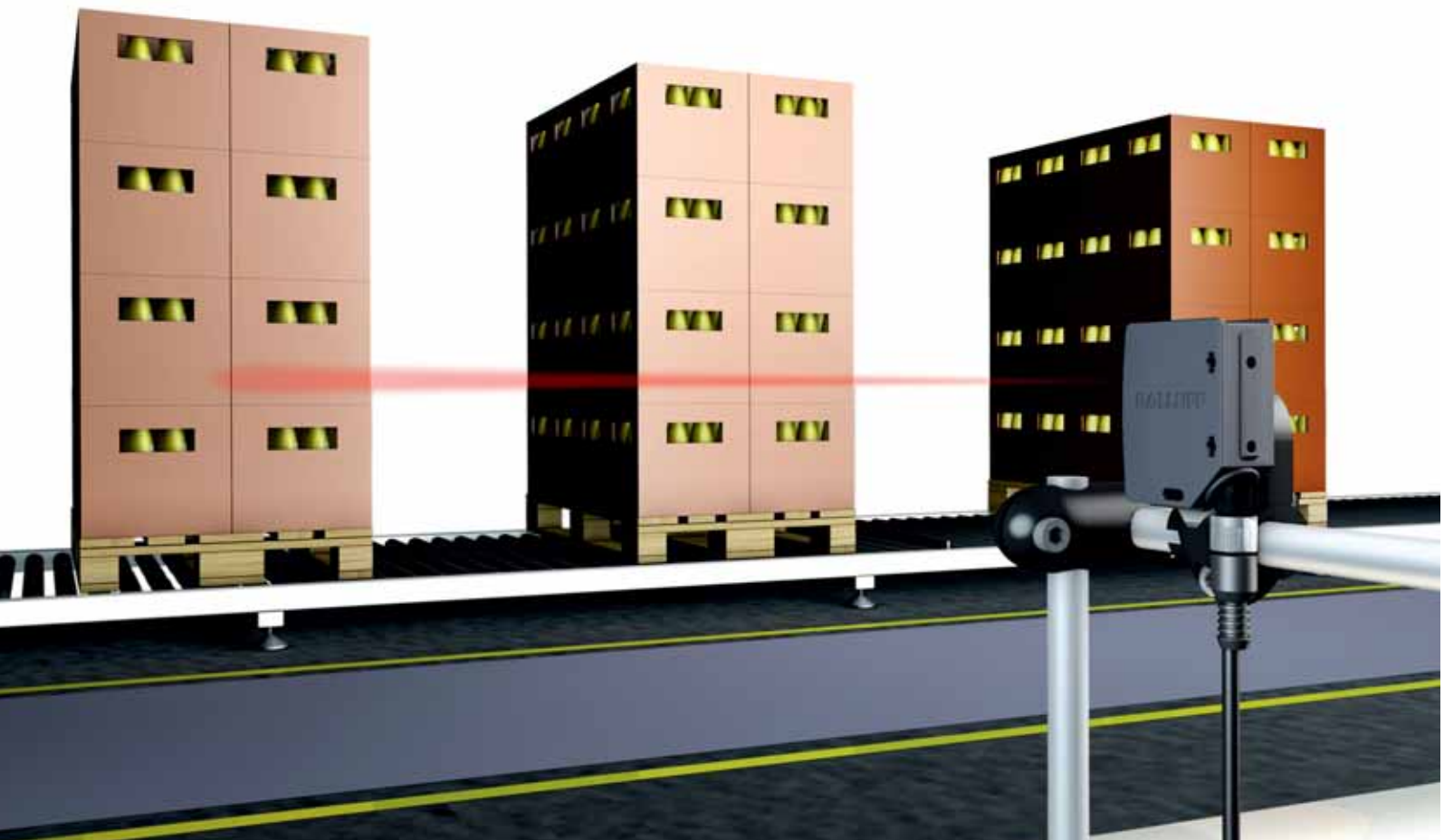
Accessories

- Reflector BOS R-1, circular, dia. 84 mm (ordering code: **BAM00UK**)
- Mounting bracket BMS CS-M-D12-BX07-06, for Balluff mounting system, 90° angle (ordering code: **BAM01AY**)
- Assembly plate BMS CS-M-D12-BX05-02, for Balluff mounting system, straight (ordering code: **BAM003C**)
- Mounting bracket BAM MB-XO-005-B04-4, angle for surface assembly 90°, adjustable sensor inclination (ordering code: **BAM01E8**)
- Clamp holder BOS 21-KH-2, for fastening to dovetail (ordering code: **BAM00TH**)
- Connector BCC M415-0000-1A-003-PX0434-020 M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.

- Innovative technology enables previously unattained switching distances
- Intelligent sensor technology enables detection of low-reflective objects
- Easy to align due to a precise, clearly visible red light spotlight
- Setting is convenient with Teach-in or IO-Link
- With IO-Link you can configure up to 4 switching points individually

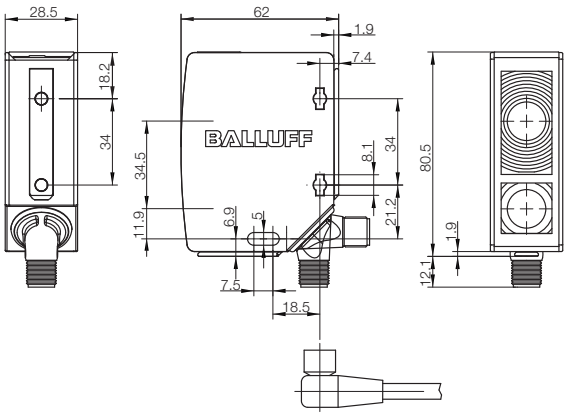
Conventional diffuse sensors are frequently used in industrial automation. However, these often reach their limits if longer switching distances are involved. Not the case for the new Balluff diffuse sensors with Super Long Range Technology. You solve complex jobs right where, in the past, energetic sensors failed due to their range limitations. The high-performance diffuse sensors of the BOS 50K product family feature a maximum scanning range of up to 3.5 m. They are easy to operate. And the red light spot, which has extremely good visibility, supports fast and accurate adjustments. In the version with IO-Link, it is even possible to have four individually configurable switching points. Additional IO-Link features, such as being able to specify a switch range, provide for even more versatile options for using the new BOS 50K Super Long Range diffuse sensors.



Photoelectric Sensors BOS 50K

Diffuse sensor with enormous range – Super Long Range Technology

New



Diffuse sensor

Ordering code
Part number

		BOS01JA BOS 50K-PU-RD11-S4	BOS01JH BOS 50K-NU-RD11-S4	BOS01JJ BOS 50K-PI-RD11-S4
Scanning range		1...3500 mm		
Light type		Red light		
Supply voltage U_B		10...30 VDC		
Interface	Digital output	■	■	
	IO-Link			■
Setting/configuration	Teach-in	■	■	
	Teach-in or IO-Link			■
Switching frequency		200 Hz		
Housing material		PC/ABS		
Optical surface		Glass		
Degree of protection		IP 67		
Ambient temperature T_a		–5 to +55°C		
Connection		M12 connector, 4-pin		

Accessories
- Mounting bracket BMS CS-M-D12-BX07-06, for Balluff assembly system, 90° angle (ordering code: **BAM01AY**)
- Assembly plate BMS CS-M-D12-BX05-02, for Balluff assembly system, straight (ordering code: **BAM003C**)
- Mounting bracket BAM MB-XO-005-B04-4, angle for surface assembly 90°, adjustable sensor inclination (ordering code: **BAM01E8**)
- Clamp holder BOS 21-KH-2, for fastening to dovetail (ordering code: **BAM00TH**)
- Connector BCC M415-0000-1A-003-PX0434-020 M12 straight, 2 m PUR cable (ordering code: **BCC032F**)

Further accessories upon request.

- Distinguishes between different color shades
- Reliably distinguishes between the smallest of color nuances
- Large sensing range of 400 mm
- Simple configuration and visualization using software
- Robust metal housing

The True Color Sensor BFS 33M is in a completely different league to conventional RGB sensors. Thanks to its high resolution, it not only detects colors but can also reliably distinguish between nuances. The True Color Sensor thus detects, e.g. minimal color deviations in injection molded parts. And it can also tell if a metal enters production polished or unpolished. Faded colors or poor print quality are detected in an instant and separated. It thus opens up completely new dimensions in quality control. The sensor uses three digital outputs and a serial interface to perform evaluations. The lab color space values are transmitted directly via this interface.

True Color Sensor BFS 33M

For distinguishing between the smallest of color nuances at the highest level

400 mm sensing range
possible with additional lens!

Type	True Color Sensor BFS
Ordering code	**BFS000L**
Part number	BFS 33M-GSS-F01-PU-02
Channels (outputs)	3 (7 colors + background)
Color space	CIELab
Switching frequency	1.5 kHz (on 3 products)
Resolution	8 enhancement settings, 12 bit
Color resolution	< 0.5 dE
Repeat accuracy	< 1 dE
Protection class	IP 54
Ambient temperature T_a	–10...+55 °C
Housing material	Al coated

Type	Plastic fiber optic BFO
Ordering code	**BFO00C4**
Part number	BFO D22-XB-LB-EAK-15-SA1-02
Operating principle	Buttons
Sensing distance	5...80 mm, up to 400 mm with additional lens
Dispersion angle	60°
Connection	SMA connector
Length	2000 mm
Ambient temperature T_a	–55...+70 °C
Fiber optic material	Plastic POF
Sleeve material	Plastic

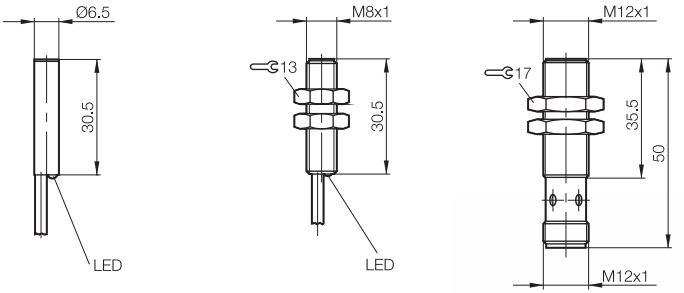
Type	Lens (Long Range)
Ordering code	**BAM01PA**
Part number	BAM LS-FO-001-M6-L
Sensing distance	400 mm
Light spot diameter	23 mm at a distance of 400 mm
Ambient temperature T_a	–10...+140 °C
Lens material	Glass
Housing material	Aluminum-coated

Note: This lens is screwed onto the fiber optic BFO00C4

Industries

- Automobile industry
- Plastics processing
- Packaging industry
- Handling and assembly
- Printing industry
- Timber processing

Model		BMF 07M	BMF 08M	BMF 12M
Maximum switching distance (with BAM01EL)		90 mm	90 mm	90 mm
PNP NO	**Ordering code**	**BMF000E**	**BMF000P**	**BMF00C7**
	Part number	BMF 07M-PS-C-2-KPU -02	BMF 08M-PS-C-2-KPU -02	BMF 12M-PS-C-2-S4
Supply voltage U_B		10...30 V DC	10...30 V DC	10...30 V DC
Reverse polarity/short-circuit protected		Yes/yes	Yes/yes	Yes/yes
Function indicator		Yellow LED	Yellow LED	Yellow LED
Ambient temperature T_a		–25...+85 °C	–25...+85 °C	–25...+70 °C
Degree of protection per IEC 60529		IP 67	IP 67	IP 67
Connection		2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	M12 connector, 3-pin



Size	Ø 15 mm	Ø 15 mm	Ø 25 mm with hole for M5 screw	Ø 22.1 mm with M5 screw hole
Ordering code	**BAM01EJ**	**BAM01EK**	**BAM01EL**	**BAM01EM**
Part number	BAM TG-MF-006	BAM TG-MF-007	BAM TG-MF-008	BAM TG-MF-009
Height	10 mm	15 mm	15 mm	10.5 mm
Max. switching distance	40 mm	65 mm	90 mm	40 mm

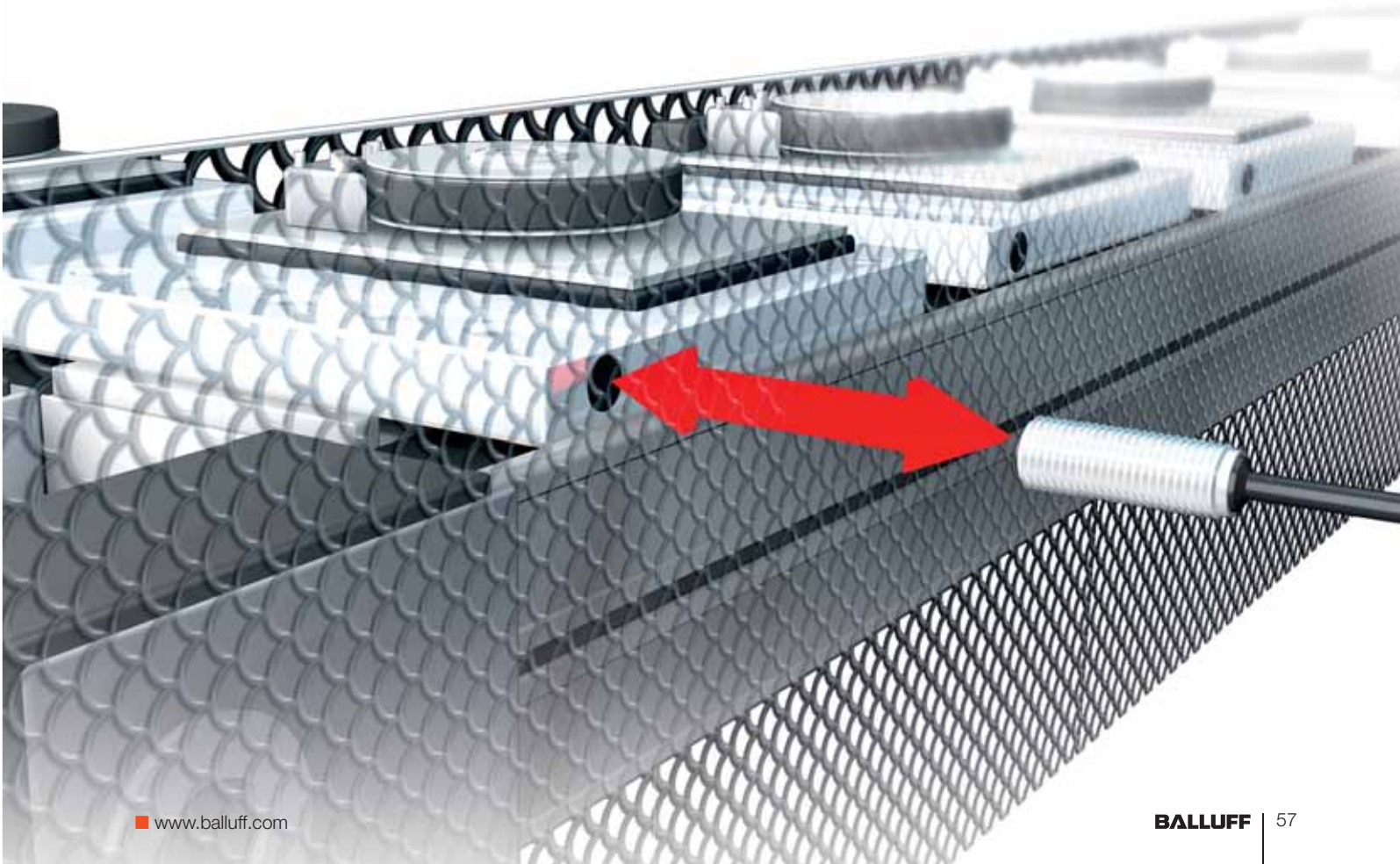
Reliable switching is guaranteed from 0 mm to the switching distance indicated in the table.
The specified switching distances are determined from series measurements and should be considered a starting point for selecting a suitable magnet.

Magnetic Cylinder Sensors for Large Ranges

Miniature design, long switching distances

Magnetic cylinder sensors feature small, extremely compact designs. Their magnets enable very great switching distances for position sensing, which means that you can query positions up to 90 mm away using a single sensor with a diameter of 6.5 mm. Positions can also be scanned through containers or pipes because magnetic fields can penetrate many non-magnetizable materials. The detection of codes using magnets is also possible.

- Non-contact position requests up to a distance of 90 mm
- Object detection through non-magnetizable materials
- Compact sensors and small magnets provide the perfect basis for installation
- Outstanding price/performance ratio



Ultrabright LED

Reliable detection of switching function from far away (25 m in bright factory building)

New mounting concept

Solid hold in the slot, sensor cannot be wrenched from the slot

Knurled screw

Sensor screws in firmly, extremely secure hold in any slot (e.g. Parker, Festo, SMC, Bosch)

Minimum length: 23 mm!
8 mm shorter than previous model

Can also be used in space-critical applications

Can be installed from above: easy to install with hexagon socket or slot screwdriver.

For other pneumatic cylinder sensors, please request a copy of our brochure "BMF magnetic field sensor product overview".

Sensors for Pneumatic Cylinders

BMF 235 – The new benchmark for every T-slot

With our special retaining elements, the BMF 235 can also be quickly and easily assembled on round, tie bar and profile cylinders.

Know your cylinder?
Find your sensor at:
www.balluff.com/bmfcenter

Size			**BMF 235**	**BMF 235**
Dimensions (H×W×L)			5.5×5×23.5 mm	5.5×5×23.5 mm
PNP	NO	**Ordering code**	**BMF00C4**	**BMF00AR**
		Part number	BMF 235K-PS-C-2A-SA2-S49-00,3	BMF 235K-PS-C-2A-PU-02
	NC	**Ordering code**	**BMF00C6**	**BMF00AT**
		Part number	BMF 235K-PO-C-2A-SA2-S49-00,3	BMF 235K-PO-C-2A-PU-02
NPN	NO	**Ordering code**	**BMF00C2**	**BMF00AU**
		Part number	BMF 235K-NS-C-2A-SA2-S49-00,3	BMF 235K-NS-C-2A-PU-02
	NC	**Ordering code**	**BMF00C3**	**BMF00AW**
		Part number	BMF 235K-NO-C-2A-SA2-S49-00,3	BMF 235K-NO-C-2A-PU-02
Supply voltage U_B			10...30 V DC	10...30 V DC
Ambient temperature T_a			–25...+85 °C	–25...+85 °C
Degree of protection as per IEC 60529			IP 67	IP 67
Housing material			Plastic	Plastic
Connection			0.3 m cable PUR with M8 connector, 3-pin	2 m PUR cable, 3×0.14 mm²
Approval			CE, cULus	CE, cULus
Installation			Can be installed from above	Can be installed from above
Cylinder profile			T-slot	T-slot

Other plug and cable variants are available in addition to V-Twin models.
For information, visit our website at **www.balluff.com**

Series			**V-Twin**	**V-Twin**
Size			M8	M12
PNP	NO	**Ordering code**	**BMF00CA**	**BMF00C9**
		Part number	BMF 235K-PS-C-2A-SA95-S75-00,3	BMF 235K-PS-C-2A-SA95-S4-00,3

Part number
For round cylinders: BMF 307-HW-96 (ordering code: **BAM01J5**) with hose clamp BMF size 2 (ordering code: **BAM00N4**)

Cylinder profile	Part number
Profile cylinder and tie bar up to 5...11 mm	BMF 235-HW-109 (ordering code: **BAM01M9**)
Profile cylinder and tie bar up to 9...15 mm	BMF 235-HW-110 (ordering code: **BAM01MA**)
Profile cylinder and tie bar 14...20 mm	BMF 235-HW-111 (ordering code: **BAM01MC**)

New

New mounting concept

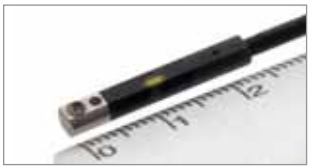
Solid hold in the slot, sensor cannot be wrenched from the slot

Can be installed in the slot from above

Can be installed even on cylinders with a dirty slot

Compact design, i.e. can be mounted flush

Can also be used in space-critical applications



Minimum length: 24 mm!

Can also be used in space-critical applications

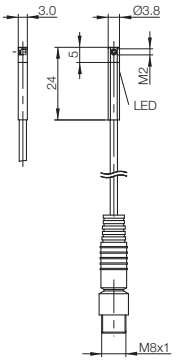
For other pneumatic cylinder sensors, please request a copy of our brochure "BMF magnetic field sensor product overview".

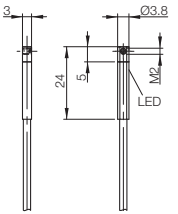
Sensors for Pneumatic Cylinders

BMF 243 – The new benchmark for every C-slot groove

Size			**BMF 243**	**BMF 243**
Dimensions (H×W×L)			3.8×24×3 mm	3.8×24×3 mm
PNP	NO	**Ordering code**	**BMF00EL**	**BMF00EF**
		Part number	BMF 243K-PS-C-2A-SA2-S49-00.3	BMF 243K-PS-C-2A-PU-02
	NC	**Ordering code**	**BMF00EM**	**BMF00EH**
		Part number	BMF 243K-PO-C-2A-SA2-S49-00.3	BMF 243K-PO-C-2A-PU-02
NPN	NO	**Ordering code**	**BMF00EN**	**BMF00EJ**
		Part number	BMF 243K-NS-C-2A-SA2-S49-00.3	BMF 243K-NS-C-2A-PU-02
	NC	**Ordering code**	**BMF00EP**	**BMF00EK**
		Part number	BMF 243K-NO-C-2A-SA2-S49-00.3	BMF 243K-NO-C-2A-PU-02
Supply voltage U_B			10...30 V DC	10...30 V DC
Ambient temperature T_a			–25...+85 °C	–25...+85 °C
Degree of protection as per IEC 60529			IP 67	IP 67
Housing material			Plastic	Plastic
Connection			0.3 m cable PUR with M8 connector, 3-pin	2 m PUR cable, 3×0.10 mm²
Approval			CE, cULus	CE, cULus
Installation			Can be installed from above	Can be installed from above
Cylinder profile			↺ C-slot/rounded groove	↺ C-slot/rounded groove

Other plug and cable variants are available in addition to V-Twin models. For information, visit our website at **www.balluff.com**





Series			**V-Twin**
Size			M8
PNP	NO	**Ordering code**	**BMF00ET**
		Part number	BMF 243K-PS-C-2A-SA95-S75-00,3

Know your cylinder?
Find your sensor at:
www.balluff.com/bmfcenter

System	BMF 303	BMF 305	BMF 103 system
Dimensions (H×W×L)	4.5×2.9×21.6 mm	10.5×6.5×33.5 mm	16×2.8×4.9 mm
Unique features	**For miniaturized actuators**	**For larger actuators**	**Optimized for short-stroke cylinders and mini-grippers**

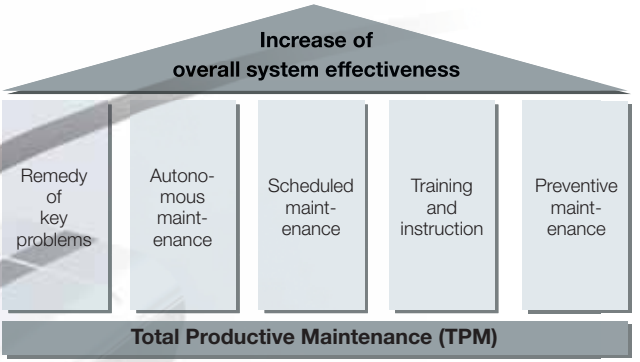
Part number of the most-used types: M8×1 male versions with turnable connection nut and 30 cm cable length

PNP	NO	BMF 303K-PS-C-2A-SA2-S49-00,3	BMF 305K-PS-C-2-SA2-S49-00,3	BMF 103K-PS-C-2A-SA2-S49-00,3

Cylinder profile	Example	Part number					
C-slot (Size 10 slot)	Festo, Sommer, Bosch	BMF 303-HW-31 Tough	BMF 303-HW-30 Compact			BMF 103-HW-102 New Hollow screw	BMF 103-HW-42
C-slot (Round slot)	SMC, Bimba, Schunk	BMF 303-HW-97 New Tough	BMF 303-HW-28 Compact			BMF 103-HW-100 New Hollow screw	BMF 103-HW-41
T-slot	General	BMF 303-HW-33 Tough	BMF 303-HW-40 Compact	BMF 305-HW-98 New Hollow screw	BMF 305-HW-20	BMF 103-HW-43	
Round cylinder	General	BMF 303-HW-59 and Hose clamp [1]		BMF 305-HW-24 undo Hose clamp [1]			
Trapezoidal slot	Bosch, Parker, Norgren	BMF 303-HW-101 New		BMF 305-HW-106 New			
Trapezoidal guide	Bosch	BMF 303-HW-80		BMF 305-HW-27			
C-slot Large	Numatics, Norgren	BMF 303-HW-62		BMF 305-HW-32 Ⓐ	BMF 305-HW-92 Ⓑ		
with rail/ SMC slot-A and slot-B	SMC	BMF 303-HW-51 (BMF 303-HW-60 [2])		BMF 305-HW-26 Slot version	BMF 305-HW-99 New Hexagon socket		
Profile cylinder and tie bar 5...11 mm	General	BMF 235-HW-109 and BMF 303-HW-33 New		BMF 235-HW-109 and BMF 305-HW-20 New		BMF 235-HW-109 and BMF 103-HW-43 New	
Profile cylinder and tie bar 9...15 mm	General	BMF 235-HW-110 and BMF 303-HW-33 New		BMF 235-HW-110 and BMF 305-HW-20 New		BMF 235-HW-110 and BMF 103-HW-43 New	
Profile cylinder and tie bar 14...20 mm	General	BMF 235-HW-111 and BMF 303-HW-33 New		BMF 235-HW-111 and BMF 305-HW-20 New		BMF 235-HW-111 and BMF 103-HW-43 New	
U slot	SMC CP95	BMF 303-HW-103 New					

Magnetic Cylinder Sensors with Mounting System

Now even more flexible due to new mounting elements



Removal of key problems
No unreliable switching, even under highest stress, due to highly precise GMR sensor elements and robust metal clamps.

Autonomous maintenance
Faster and safer sensor replacement using one sensor type for all slots with a permanent switching point.

Scheduled maintenance program
The wear-free, fully electronic sensors protect against creeping failure, even after several million switching cycles, thereby increasing your process reliability.

Training and instruction
Easy handling and reduced training effort due to one sensor type for all slots with a uniform operating principle for all mounting brackets.

Maintenance prevention
The costs for maintenance are already reduced to a minimum with the design by means of the consistent use of magnetic sensors with the mounting bracket concept.

One for all

- By selecting the right mounting bracket you can adapt these sensors to virtually every pneumatic cylinder
- All-purpose types reduce costs and save storage space
- BMF 303 system for miniaturized actuators
  BMF 305 system for larger actuators
  BMF 103 system for use on mini-grippers and in short-stroke cylinders
- SA7 variants for Schunk grippers

- Simple cable tie assembly on pipes
- Sensitive adjustment of the responsiveness using a potentiometer

The new BCS Uniflat capacitive sensors of the Global line series provide very good performance with a switching distance of up to 20 mm. With a well-conceived fastening design, their compact plastic housing can be screwed on or secured with cable ties to bypass pipes.

The connection is made using a 2 m connection line or a short pigtail line and an M8 plug. The codable output function provides PNP or NPN and normally open or normally closed functionality.

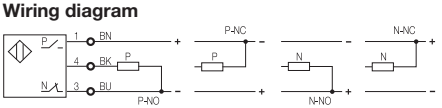
Global

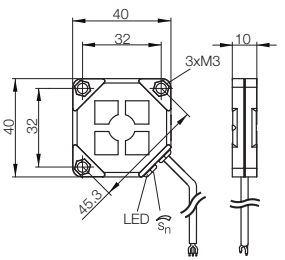
Capacitive Sensors BCS

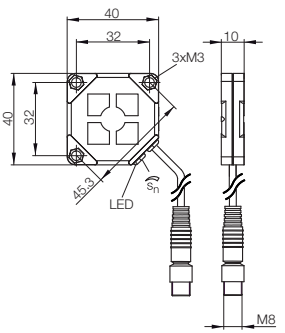
Global sensors in 40×40 mm size

Size		**40×40×10 mm** Uniflat	**40×40×10 mm** Uniflat
Installation type		flush	flush
Rated switching distance s_n		**20 mm**	**20 mm**
PNP/NPN and normally open/ normally closed selectable	**Ordering code**	**BCS00TR**	
	Part number	BCS Q40BBAA-GPC20C-EP02	
PNP normally open	**Ordering code**		**BCS00U6**
	Part number		BCS Q40BBAA-PSC20C-EP00,3-GS49
PNP normally closed	**Ordering code**		**BCS00U5**
	Part number		BCS Q40BBAA-POC20C-EP00,3-GS49
Supply voltage U_B		10...30 V DC	10...30 V DC
Voltage drop U_d at I_e		2.5 V	2.5 V
Rated insulation voltage U_i		75 V DC	75 V DC
Output current max.		100 mA	100 mA
No-load supply current I_0 max.		15 mA	15 mA
Polarity reversal/short-circuit protected		yes/yes	yes/yes
Ambient temperature T_a		–5...+85 °C	–5...+85 °C
Switching frequency f		100 Hz	100 Hz
Output function/power-on indicator		yes/yes	yes/yes
Degree of protection as per IEC 60529		IP 67	IP 67
Material	Housing	PBT	PBT
	Sensing surface	PBT	PBT
	Cover	PBT	PBT
Connection		2 m PUR cable, 3×0.14 mm²	0.3 m PUR cable with M8 plug, 3-pin

Wiring diagram

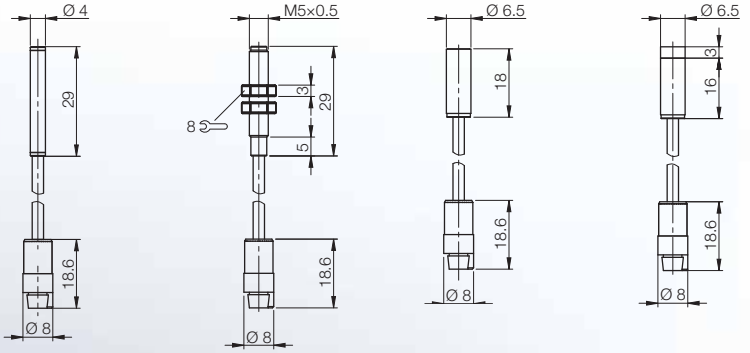






Size	**Ø 4 mm**	**M5×0.5**	**Ø 6.5 mm**	**Ø 6.5 mm**
Mounting type	Flush	Flush	Flush	Non-flush
Rated switching distance s_n	**0.1…1 mm**	**0.1…1 mm**	**0.1…1.5 mm**	**0.1…3 mm**
Ordering code	**BCS0010**	**BCS0011**	**BCS0012**	**BCS0013**
Part number	BCS G04T4D-XXS10C-EP02-GZ01-002	BCS M05T4C-XXS10C-EP02-GZ01-002	BCS G06T4B-XXS15C-EP02-GZ01-002	BCS G06T4B-XXS30G-EP02-GZ01-002
Supply voltage U_B	4…8 V DC	4…8 V DC	4…8 V DC	4…8 V DC
Rated insulation voltage U_i	75 V DC	75 V DC	75 V DC	75 V DC
Ambient temperature T_a	–30…+80 °C	–30…+80 °C	–30…+80 °C	–30…+80 °C
Switching frequency f	100 Hz	100 Hz	100 Hz	100 Hz
Degree of protection per IEC 60529	IP 67	IP 67	IP 67	IP 67
Housing material	V2A	V2A	V2A	V2A
Sensing surface material	PTFE	PTFE	PTFE	PTFE
Cover material	POM	POM	POM	POM
Connection	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²

Refer to our catalog or visit **www.balluff.com** for a large selection of capacitive sensors

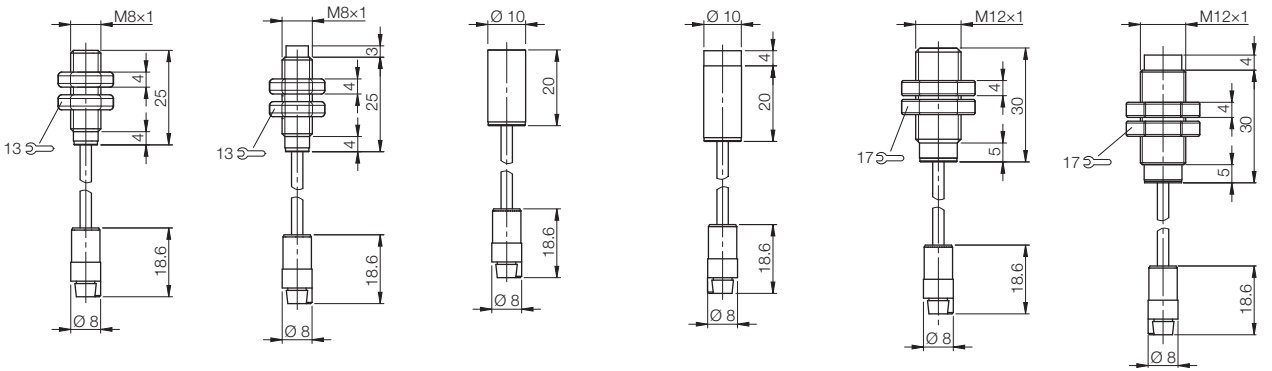


mini.S

Capacitive Mini Sensors BCS

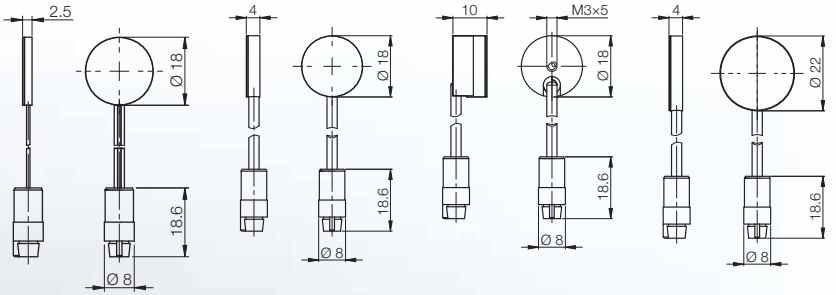
Object detection in the smallest of spaces

	M8×1	**M8×1**	**Ø 10 mm**	**Ø 10 mm**	**M12×1**	**M12×1**
	Flush	Non-flush	Flush	Non-flush	Flush	Non-flush
	0.1…1.5 mm	**0.1…3 mm**	**0.1…4 mm**	**1…8 mm**	**0.1…4 mm**	**1…8 mm**
	BCS0014	**BCS0015**	**BCS0016**	**BCS0017**	**BCS0018**	**BCS0019**
	BCS M08T4C-XXS15C-EP02-GZ01-002	BCS M08T4C1-XXS30G-EP02-GZ01-002	BCS G10T4B-XXS40C-EP02-GZ01-002	BCS G10T4C-XXS80G-EP02-GZ01-002	BCS M12T4D-XXS40C-EP02-GZ01-002	BCS M12T4D1-XXS80G-EP02-GZ01-002
	4…8 V DC	4…8 V DC	4…8 V DC	4…8 V DC	4…8 V DC	4…8 V DC
	75 V DC	75 V DC	75 V DC	75 V DC	75 V DC	75 V DC
	–30…+80 °C	–30…+80 °C	–30…+80 °C	–30…+80 °C	–30…+80 °C	–30…+80 °C
	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz	100 Hz
	IP 67	IP 67	IP 67	IP 67	IP 67	IP 67
	V2A	V2A	V2A	V2A	V2A	V2A
	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
	POM	POM	POM	POM	POM	POM
	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²



Size	Ø 18×2.5 mm	Ø 18×4 mm	Ø 18×10 mm	Ø 22×4 mm	
Mounting type	Flush	Flush	Flush	Flush	
Rated switching distance s_n	**0.1…3 mm**	**1…5 mm**	**1…5 mm**	**1…10 mm**	
Ordering code	**BCS001A**	**BCS001C**	**BCS001E**	**BCS001F**	
Part number	BCS D18T403-XXS30C-EP02-GZ01-002	BCS D18T404-XXS60C-EP02-GZ01-002	BCS D18T407-XXS50C-EP02-GZ01-002	BCS D22T405-XXS10C-EP02-GZ01-002	
Supply voltage U_B	4…8 V DC	4…8 V DC	4…8 V DC	4…8 V DC	
Rated insulation voltage U_i	75 V DC	75 V DC	75 V DC	75 V DC	
Ambient temperature T_a	–30…+70 °C	–30…+80 °C	–30…+80 °C	–30…+80 °C	
Switching frequency f	100 Hz	100 Hz	100 Hz	100 Hz	
Degree of protection per IEC 60529	IP 66	IP 66	IP 66	IP 66	
Housing material	V2A	V2A	V2A	V2A	
Sensing surface material	PTFE	PTFE	PTFE	PTFE	
Connection	2 m cable PVC, 3×0.09 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	

Refer to our catalog or visit **www.balluff.com** for a large selection of capacitive sensors

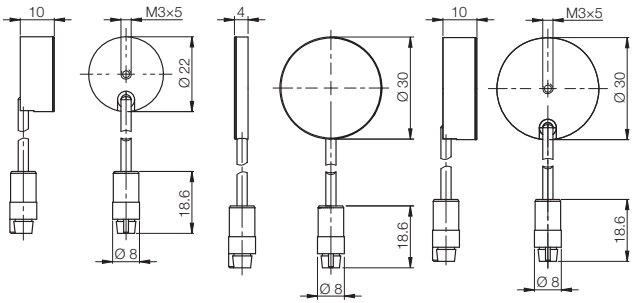


mini.S

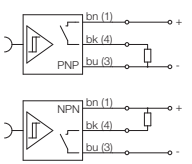
Capacitive Mini Sensors BCS

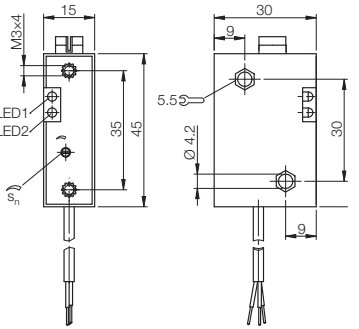
Object detection in the smallest of spaces

	Ø 22×10 mm	Ø 30×4 mm	Ø 30×10 mm
	Flush	Flush	Flush
	1…10 mm	**1…15 mm**	**1…15 mm**
	BCS001H	**BCS001J**	**BCS001K**
	BCS D22T408-XXS10C-EP02-GZ01-002	BCS D30T406-XXS15C-EP02-GZ01-002	BCS D30T409-XXS15C-EP02-GZ01-002
	4…8 V DC	4…8 V DC	4…8 V DC
	75 V DC	75 V DC	75 V DC
	–30…+80 °C	–30…+80 °C	–30…+80 °C
	100 Hz	100 Hz	100 Hz
	IP 66	IP 66	IP 66
	V2A	V2A	V2A
	PTFE	PTFE	PTFE
	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²	2 m cable PUR, 3×0.14 mm²



Size			45×30×15 mm
PNP	NO	**Ordering code**	**BAE009E**
		Part number	BAE SA-CS-001-PS
PNP	NC	**Ordering code**	**BAE009F**
		Part number	BAE SA-CS-001-PO
NPN	NO	**Ordering code**	**BAE009H**
		Part number	BAE SA-CS-001-NS
NPN	NC	**Ordering code**	**BAE009J**
		Part number	BAE SA-CS-001-NO
Supply voltage U_B			12…35 V DC
Voltage drop U_d at I_e			0.8 V
Rated insulation voltage U_i			75 V DC
Output current max.			300 mA
No-load supply current I_0 max.			20 mA
Reverse polarity/short-circuit protected			Yes/yes
Ambient temperature T_a			–30…+70 °C
Switching frequency f			100 Hz
Function indicator			Yes/yes
Degree of protection per IEC 60529			IP 67
Housing material			PC
Connection			2 m cable PUR, 3x0.14 mm²





Function overview
LED 1: Switching status indicator
LED 2: Power indicator
Pos. 1: Through-hole dia. 4.2 mm, hexagon on both sides for inserting an M3 nut.

BUS ultrasonic sensors are perfect for distance measurement or position detection of granules, fluids and powders. They measure fill levels, heights and sag without making contact as well as count and monitor the presence of objects.
They are extremely versatile, operate independently of color and surface finish, and are not affected by transparent objects that generate strong reflections.
Ultrasonic sensors are designed for critical situations. Dust, dirt and steam do not pose a problem.

Thanks to their display, the ultrasonic sensors of the BUS M30M series with a metal housing are particularly easy to operate. A complete numeric presetting of the sensor is possible. You can choose to have all measured values displayed in mm/cm or % during operation.
The sensor family includes five versions and, with a measuring range from 30 cm to 8 m, covers a wide range of applications.
All versions are available with the option of one or two switching outputs, a current and voltage analog output, or as a combination with switching output and analog output, so that nearly every application can be solved.
The sensors can be used in Multiplex operation and be automatically synchronized, so that they do not influence each other.

Features
- Display of direct measured values
- Measuring range from 30 mm to 8 m
- 1 or 2 switching outputs
- Analog output 4...20 mA and 0...10 V
- Teach-in via 2 buttons
- Temperature compensation

Scanning range			
BUS M30M switching output			
Resolution			
PNP	NO/NC	**Ordering code**	
		Part number	
2x PNP	NO/NC	**Ordering code**	
		Part number	
BUS M30M analog output			
Resolution (depends on window used)			
0...10 V/4...20 mA		**Ordering code**	
		Part number	
BUS M30M switching and analog output			
Resolution (depends on window used)			
0...10 V/4...20 mA		**Ordering code**	
PNP NO/NC		Part number	

Size		
Supply voltage		
Output current		
Degree of protection as per EN 60529		
Operating temperature		
Material	Housing	
	Plastic parts	
	Sensing surface	
Connection		

NPN versions can be found in the Ultrasonic catalog

Ultrasonic Sensors
BUS M30M with display

	30...250 mm	65...350 mm	200...1300 mm	350...3400 mm	600...6000 mm
	0.025 mm	0.025 mm	0.18 mm	0.18 mm	0.18 mm
	BUS0022	**BUS005F**	**BUS0039**	**BUS003P**	**BUS0045**
	BUS M30M1-PPX-03/025-S92K	BUS M30M1-PPX-07/035-S92K	BUS M30M1-PPX-20/130-S92K	BUS M30M1-PPX-35/340-S92K	BUS M30M1-PPX-60/600-S92K
	BUS002R	**BUS005H**	**BUS003C**	**BUS003W**	**BUS003Z**
	BUS M30M1-PWX-03/025-S92K	BUS M30M1-PWX-07/035-S92K	BUS M30M1-PWX-20/130-S92K	BUS M30M1-PWX-35/340-S92K	BUS M30M1-PWX-60/600-S92K
	0.025...0.10 mm	0.025...0.17 mm	0.18...0.57 mm	0.18...1.5 mm	0.18...2.4 mm
	BUS002N	**BUS005K**	**BUS003F**	**BUS003T**	**BUS0041**
	BUS M30M1-XC-03/025-S92K	BUS M30M1-XC-07/035-S92K	BUS M30M1-XC-20/130-S92K	BUS M30M1-XC-35/340-S92K	BUS M30M1-XC-60/600-S92K
	0.025...0.10 mm	0.025...0.17 mm	0.18...0.57 mm	0.18...1.5 mm	0.18...2.4 mm
	BUS002L	**BUS005M**	**BUS0038**	**BUS003L**	**BUS0043**
	BUS M30M1-PPC-03/025-S92K	BUS M30M1-PPC-07/035-S92K	BUS M30M1-PPC-20/130-S92K	BUS M30M1-PPC-35/340-S92K	BUS M30M1-PPC-60/600-S92K
	M30×1	M30×1	M30×1	M30×1	M30×1
	9...30 V DC	9...30 V DC	9...30 V DC	9...30 V DC	9...30 V DC
	200 mA	200 mA	200 mA	200 mA	200 mA
	IP 67	IP 67	IP 67	IP 67	IP 67
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	Nickel-plated CuZn	Nickel-plated CuZn	Nickel-plated CuZn	Nickel-plated CuZn	Nickel-plated CuZn
	PBT, TPU	PBT, TPU	PBT, TPU	PBT, TPU	PBT, TPU
	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass
	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin

With a housing length of only 41 mm, the new BUS 18M ultrasonic sensors are extremely compact. With their narrow sound cone and a blind zone of only 20 mm, they provide flexible application options. Two housing variants – straight and with a 90° angle head – are available, each with four scanning ranges up to 1.3 m. The sensor family covers a broad range of applications – through three different output stages: a push-pull switching output or an analog output, available with 4...20 mA or 0...10 V. The highlight is the complete support of the IO-Link interface. Via the switching output, the sensors can communicate with an IO-Link-capable controller or an IO-Link master.

The sensors can be synchronized with one another, so that they do not influence one another.

Features

- 2 Housing variants
- Measuring range from 20 mm to 1.3 m
- Push-pull switching output
- Analog output 4...20 mA or 0...10 V
- Teach-in via control line
- Temperature compensation

Scanning range			

BUS M18M switching output, straight

Resolution			
push/pull	NO/NC	**Ordering code**	
	IO-Link	Part number	

BUS W18M switching output, angled

Resolution			
push/pull	NO/NC	**Ordering code**	
	IO-Link	Part number	

BUS M18M analog output, straight

Resolution (depends on window used)			
0...10 V	rising/	**Ordering code**	
	falling	Part number	
4...20 mA	rising/	**Ordering code**	
	falling	Part number	

BUS W18M analog output, angled

Resolution (depends on window used)			
0 to 10 V	rising/	**Ordering code**	
	falling	Part number	
4 to 20	rising/	**Ordering code**	
mA	falling	Part number	

Size		
Supply voltage		
Output current		
Degree of protection as per EN 60529		
Operating temperature		
Material	Housing	
	Plastic parts	
	Sensing surface	
Connection		

Ultrasonic Sensors

BUS 18M with IO-Link – also available in version with 90° angle head

	20…150 mm	**30…250 mm**	**65…350 mm**	**120…1000 mm**
	0.069 mm	0.069 mm	0.069 mm	0.069 mm
	BUS0020	**BUS0029**	**BUS004Z**	**BUS004P**
	BUS M18M1-GPXI-02/015-S92G	BUS M18M1-GPXI-03/025-S92G	BUS M18M1-GPXI-07/035-S92G	BUS M18M1-GPXI-12/100-S92G
	0.069 mm	0.069 mm	0.069 mm	0.069 mm
	BUS0023	**BUS002A**	**BUS004Y**	**BUS004N**
	BUS W18M1-GPXI-02/015-S92G	BUS W18M1-GPXI-03/025-S92G	BUS W18M1-GPXI-07/035-S92G	BUS W18M1-GPXI-12/100-S92G
	0.069...0.10 mm	0.069...0.10 mm	0.069...0.17 mm	0.069...0.38 mm
	BUS0026	**BUS0024**	**BUS004T**	**BUS0052**
	BUS M18M1-XA-02/015-S92G	BUS M18M1-XA-03/025-S92G	BUS M18M1-XA-07/035-S92G	BUS M18M1-XA-12/100-S92G
	BUS0025	**BUS002C**	**BUS004W**	**BUS004M**
	BUS M18M1-XB-02/015-S92G	BUS M18M1-XB-03/025-S92G	BUS M18M1-XB-07/035-S92G	BUS M18M1-XB-12/100-S92G
	0.069...0.10 mm	0.069...0.10 mm	0.069...0.17 mm	0.069...0.38 mm
	BUS0028	**BUS0050**	**BUS004R**	**BUS0051**
	BUS W18M1-XA-02/015-S92G	BUS W18M1-XA-03/025-S92G	BUS W18M1-XA-07/035-S92G	BUS W18M1-XA-12/100-S92G
	BUS0027	**BUS002E**	**BUS004U**	**BUS0053**
	BUS W18M1-XB-02/015-S92G	BUS W18M1-XB-03/025-S92G	BUS W18M1-XB-07/035-S92G	BUS W18M1-XB-12/100-S92G
	M18×1	M18×1	M18×1	M18×1
	10...30 V DC	10...30 V DC	10...30 V DC	10...30 V DC
	200 mA	200 mA	200 mA	200 mA
	IP 67	IP 67	IP 67	IP 67
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	Nickel-plated brass tube	Nickel-plated brass tube	Nickel-plated brass tube	Nickel-plated brass tube
	PBT	PBT	PBT	PBT
	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass	Polyurethane foam, epoxy resin containing glass
	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin	M12 connector, 5-pin

The small ultrasonic sensors in a block-shaped housing operate with high resolution, so that they leave nothing wanting in terms of accuracy.

For tough measuring tasks, the BUS R06K1..02/007 and BUS R06K1..02/015 can be equipped with a sound transmission attachment. This makes it possible to carry out measurements in bore holes and openings with diameters > 5 mm.
Due to its short response delay and the high switching frequency of 125 Hz, the BUS R06K1..02/015 is particularly suitable for detecting fast processes.

The series has a synchronization input for simultaneous operation of up to ten sensors where space is at a minimum. The diversity of their versions with switching output or current or voltage analog output with five scanning ranges offer nearly endless fields of application.

Features

- Measuring range from 20 mm to 1 m
- 1 switching output
- Analog output 4...20 mA or 0...10 V
- Teach-in via button
- Synchronization input
- Version with high switching frequency
- Sound transmission attachment optional

Scanning range			
BUS R06K switching output			
Resolution			
PNP	NO/NC	**Ordering code**	
		Part number	
PNP	NO/NC	**Ordering code**	
125 Hz		Part number	
BUS R06K analog output			
Resolution (depends on window used)			
0...10 V		**Ordering code**	
		Part number	
4...20 mA		**Ordering code**	
		Part number	

Size		
Supply voltage		
Output current		
Degree of protection as per EN 60529		
Operating temperature		
Material	Housing	
	Sensing surface	
Connection		

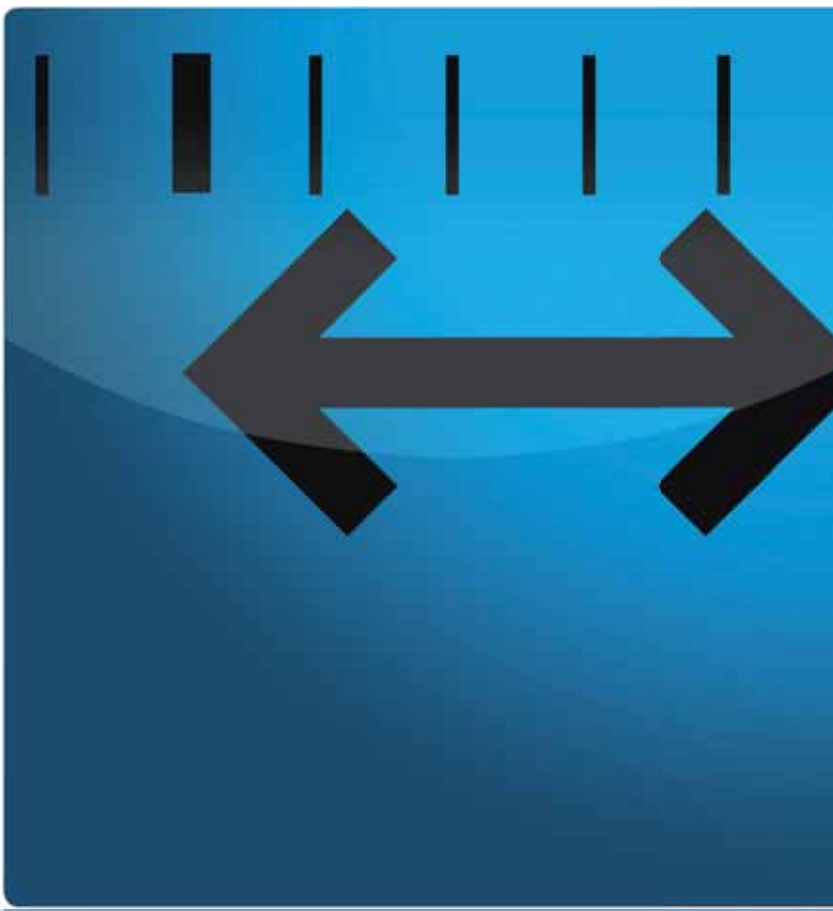
NPN versions can be found in the Ultrasonic catalog

Ultrasonic Sensors
BUS R06K mini-sensor

	20…70 mm	**20…150 mm**	**55…240 mm**	**30…250 mm**	**120…700 mm**
	0.056 mm	0.056 mm	0.037 mm	0.069 mm	0.037 mm
	BUS0021	**BUS004C**	**BUS004L**	**BUS0057**	**BUS0059**
	BUS R06K1-PPX-02/007-S75G	BUS R06K1-PPX-02/015-S75G	BUS R06K1-PPX-05/024-S75G	BUS R06K1-PPX-03/025-S75G	BUS R06K1-PPX-12/070-S75G
		BUS0049			
		BUS R06K1-PPX-02/015-S75G-F01			
		0.056 mm	0.037...0.072 mm		0.037...0.215 mm
		BUS004K	**BUS0056**		**BUS005E**
		BUS R06K1-XA-02/015-S75G	BUS R06K1-XA-05/024-S75G		BUS R06K1-XA-12/070-S75G
		BUS004J	**BUS004F**		**BUS005C**
		BUS R06K1-XB-02/015-S75G	BUS R06K1-XB-05/024-S75G		BUS R06K1-XB-12/070-S75G
	21.6×32×12 mm	21.6×32×12 mm	23×32×12 mm	20×32×23 mm	20×32×18 mm
	20...30 V DC	20...30 V DC	20...30 V DC	20...30 V DC	20...30 V DC
	200 mA	200 mA	200 mA	200 mA	200 mA
	IP 67	IP 67	IP 67	IP 67	IP 67
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	ABS	ABS	ABS	ABS	ABS
	Polyurethane foam	Polyurethane foam	Polyurethane foam	Polyurethane foam	Polyurethane foam
	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin	M8 connector, 4-pin

Linear
Position Sensing

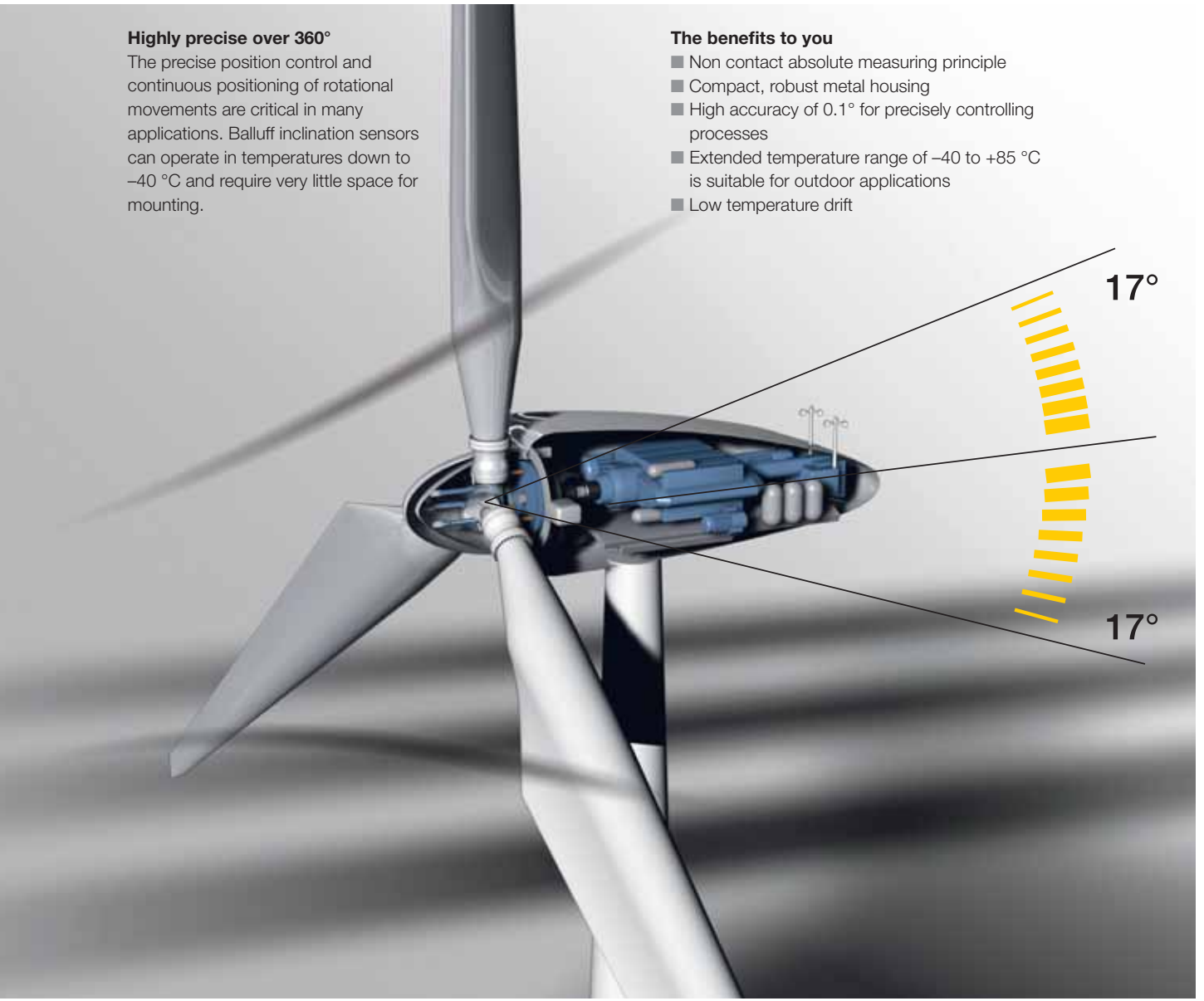
Inclination Sensors
High-pressure Inductive Sensors
Inductive Positioning System
Micropulse Transducers



New

Highly precise over 360°
The precise position control and continuous positioning of rotational movements are critical in many applications. Balluff inclination sensors can operate in temperatures down to –40 °C and require very little space for mounting.

The benefits to you
- Non contact absolute measuring principle
- Compact, robust metal housing
- High accuracy of 0.1° for precisely controlling processes
- Extended temperature range of –40 to +85 °C is suitable for outdoor applications
- Low temperature drift

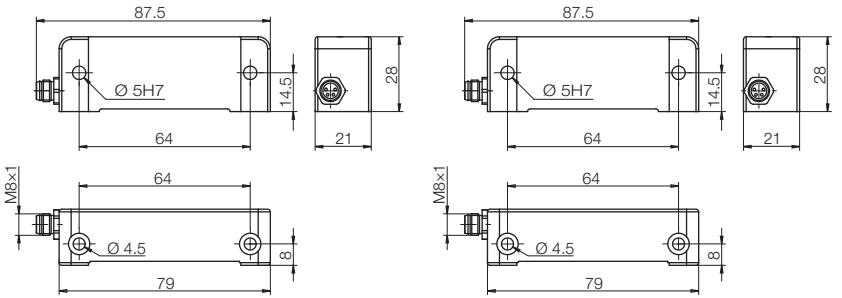


BSI Inclination Sensors

No angles missed

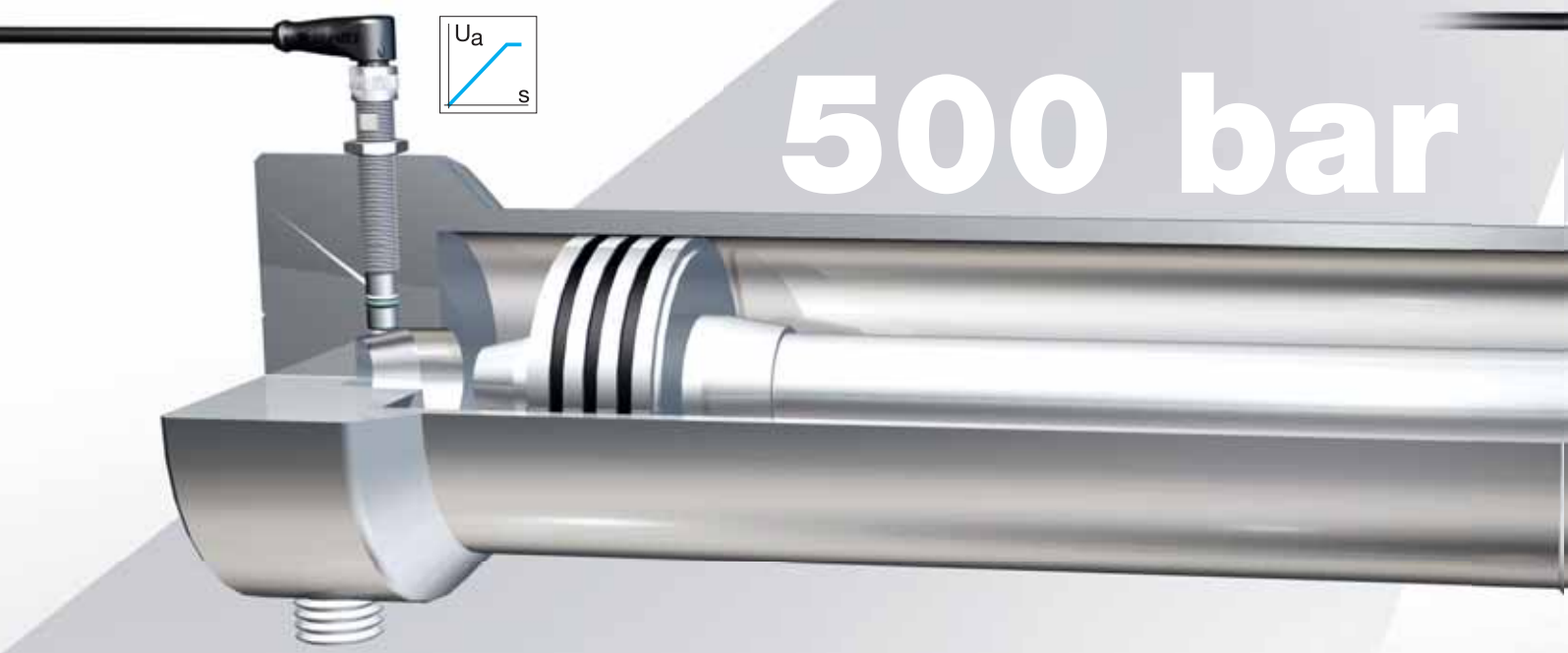
Size		**79×28×20 mm**	**79×28×20 mm**
Interface		**4...20 mA**	**Modbus RTU RS-485**
Measuring range	**Ordering code**	**BSI0004**	**BSI0003**
0...360°	Part number	BSI R11A0-XB-CXP360-S75G	BSI R11A0-XXR-CXP360-S75G
Measuring range	**Ordering code**	**BSI0002**	
±45°	Part number	BSI R11A0-XB-CXS045-S75G	
Supply voltage U_B		10...30 V DC	10...30 V DC
Current consumption		< 31 mA	< 20 mA
Resolution max.		±0.01°	±0.01°
Max. characteristic deviation		±0.1% (min. 0.1°)	±0.1° at 10 to 40 °C, ±0.15° in any other temperature range
Temperature drift		±0.01%/10 K	
Sampling rate		< 150 ms	< 150 ms
Settling time		< 1 s	< 1 s
Polarity reversal protected/short-circuit protected		yes/yes	yes/yes
Degree of protection as per IEC 60529		IP 67	IP 67
Ambient temperature range T_a		–40...+85 °C	–40...+85 °C
Weight		Approx. 80 g	Approx. 80 g
Housing material		Aluminum	Aluminum
Calibration, measurement protocol		Optional	Optional
Connection		M8 connector, 4-pin	M8 connector, 4-pin

Refer to our BSI inclination sensor brochure or visit **www.balluff.com** for further information



- One design – two output models
- Switching for final position detection
- Analog for control of valves or immediate stop
- Measurements of valves and cylinders possible
- Ceramic on medium side – robust
- Oil pressure up to 500 bar

Application areas
- Control of valves
- Final position of installation supports
- Service measurements of valves
- Position monitoring in hydraulic systems

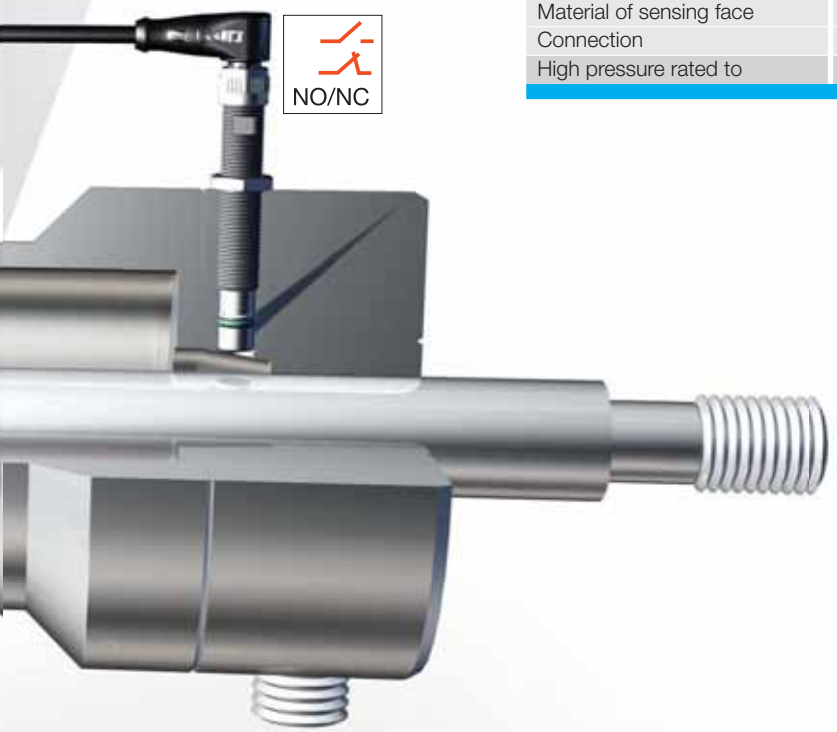


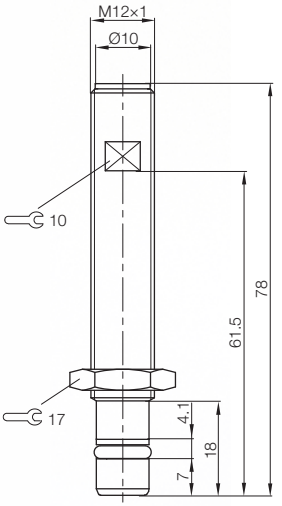
500 bar

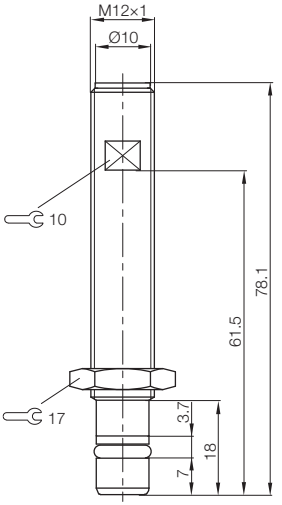
High-pressure Inductive Sensors

Switching or analog up to 500 bar

Size	**M12×1**	**M12×1**
Mounting type	Flush	Flush
Rated switching distance s_n	**1.5 mm**	
Ordering code	**BHS0076**	**BAW0040**
Part number	BHS B135V-PAD15-S04-007	BAW Z08EO-UAD20B-S04G-H11
Output signal	PNP complementary	0...10 V
Detection range		0.5...2 mm
Supply voltage U_B	12...36 V DC	10...30 V DC
Ambient temperature range	–25...+85 °C	–25...+85 °C
Sensor degree of protection per IEC 60529	IP 68	IP 68
Housing material	Stainless steel	Stainless steel
Material of sensing face	Ceramic	Ceramic
Connection	M12 connector	M12 connector
High pressure rated to	**500 bar**	**500 bar**



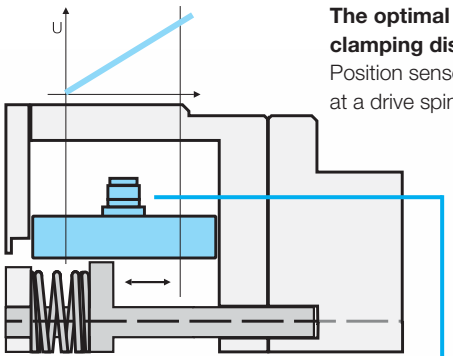




- Absolute measuring principle, several measuring ranges, teachable
- High level of repeat accuracy and precision
- Optimal linearity and low temperature drift
- Optimized housing design for clamping distance monitoring
- Distance-proportional IO-Link output signal
- Standard output 0...10 V, 4...20 mA

The inductive positioning system BIP is the accurate measuring system for the position detection of metallic objects.

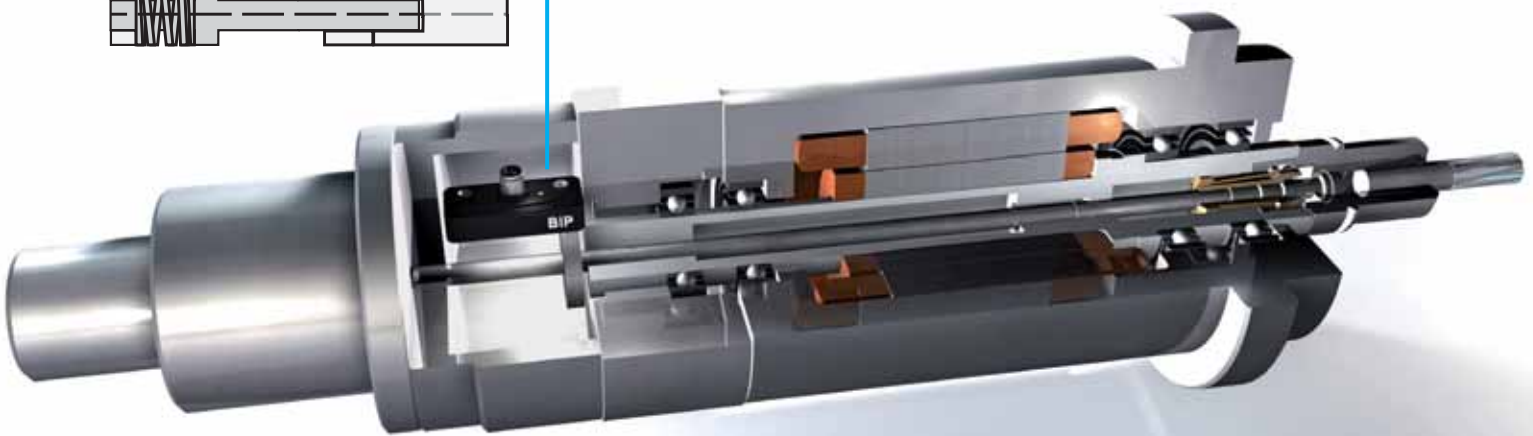
Applications
The main application area of the BIP is the linear position monitoring of drive spindles and clamping devices for tools and workpieces.



The optimal sensor for clamping distance monitoring
Position sensor BIP in use at a drive spindle for tools.

IO-Link

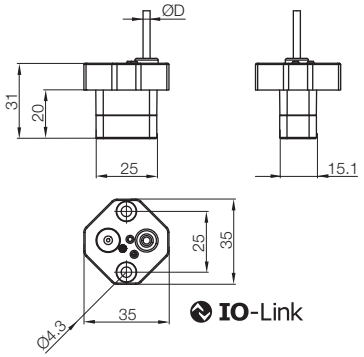
Ordering code	
Part number	
Output signal	
Length of measuring range is teachable	
Detection range	
Target width (EC80)	
Target distance	
Resolution	
Repeat accuracy	
Non-linearity	
Ambient temperature range	
Connection	
Supply voltage	
Housing material	
Function indicator LED	

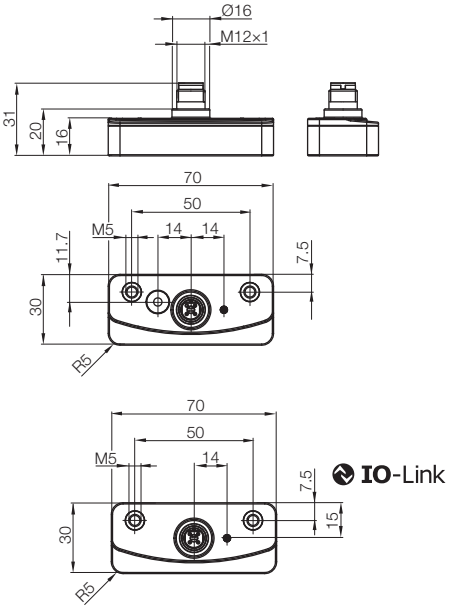


Inductive Positioning System BIP

Perfectly integratable

	BIP0001	BIP0007	BIP0008	BIP0002	BIP0004	BIP0005
	BIP AD0-B014-01-EP02	BIP LD2-T014-01-EP02	BIP CD2-B014-01-EP02	BIP AD2-B040-02-S4	BIP LD2-T040-02-S4	BIP CD2-B040-02-S4
	0...10 V	IO-Link	4...20 mA	0...10 V	IO-Link	4...20 mA
	7...14 mm			20...40 mm		
	0...14 mm			0...40 mm		
	8 mm			14 mm		
	0,5...2 mm			1...3 mm		
	14 µm			40 µm		
	±80 µm			±80 µm		
	±250 µm			±400 µm		
	–25...+70°C			–25...+85°C		
	2 m cable			M12 connector		
	15...30 V (IO-Link 18...30 V)			15...30 V (IO-Link 18...30 V)		
	PA			PA		
	Yes			Yes		



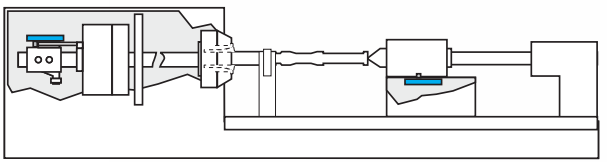


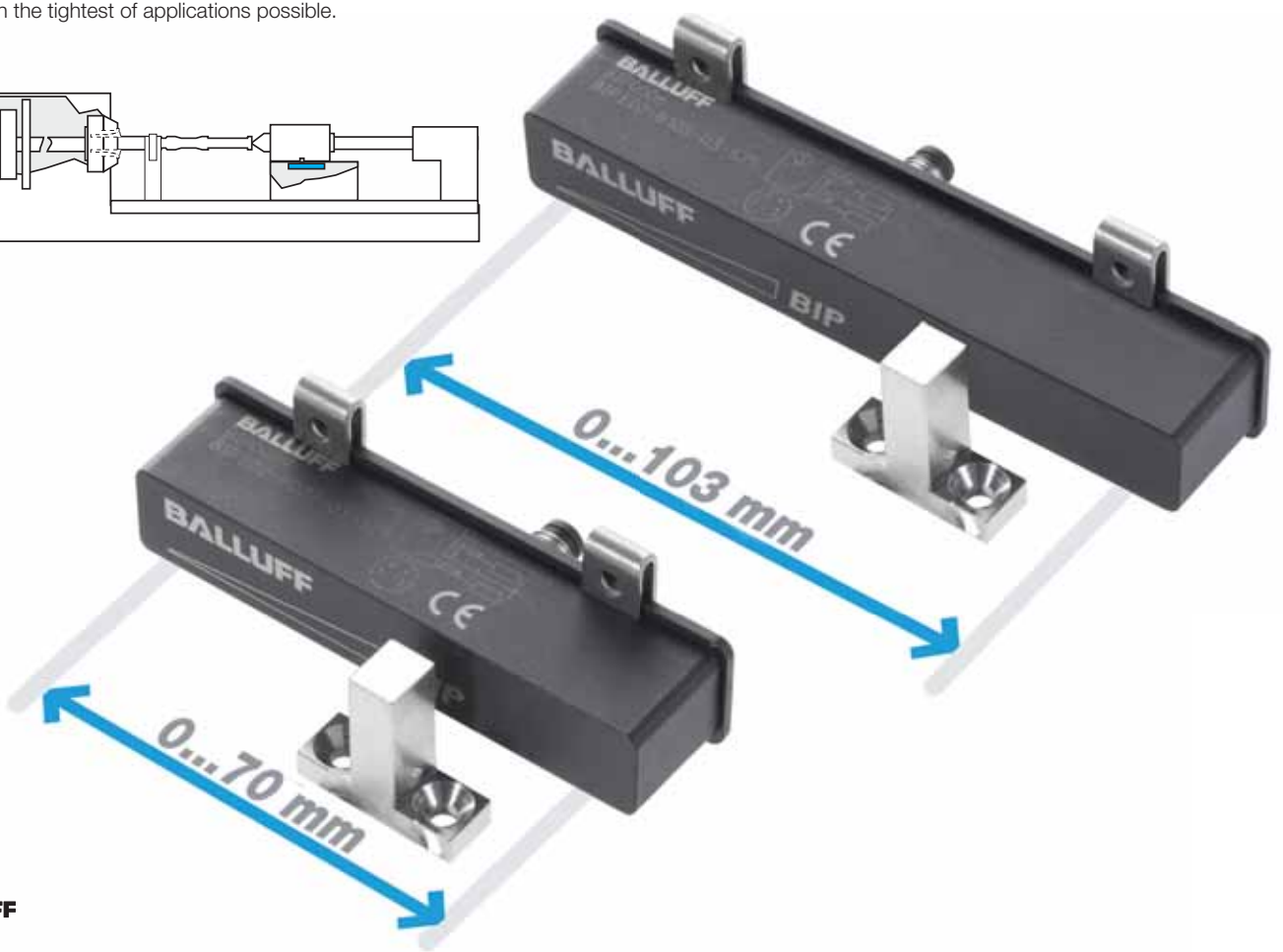
- Absolute measuring principle, several measuring ranges, teachable
- High level of repeat accuracy and precision
- Wide working temperature range and low temperature drift
- Optimized housing design, degree of protection IP 67
- Standard output 0...10 V, 4...20 mA

The inductive positioning system BIP is the accurate measuring system for the position detection of metallic objects.

Applications

These BIP positioning systems are ideal for integrated production monitoring because their unmatched effective length ratio makes installation in the tightest of applications possible.





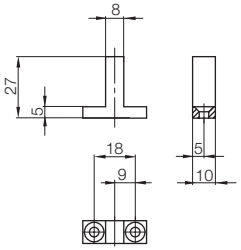
Inductive Positioning System BIP
Optimized effective length

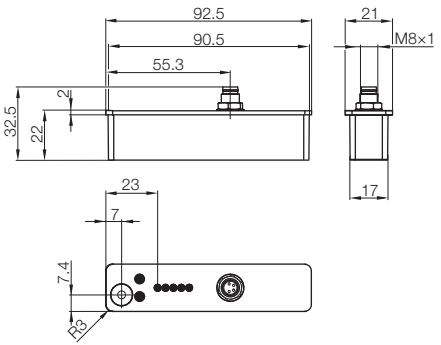
teachable

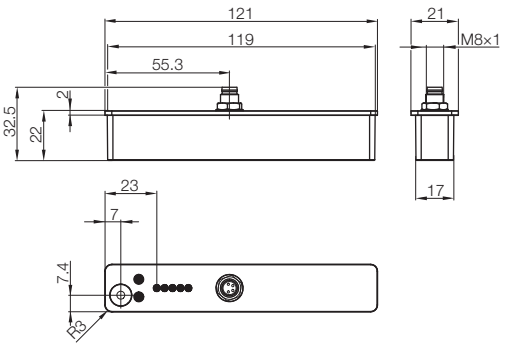
teachable

Ordering code	BIP000C	BIP000E
Part number	BIP ED2-B070-03-S75	BIP ED2-B103-03-S75
Output signal	0...10 V and 4...20 mA	0...10 V and 4...20 mA
Length of measuring range is teachable	35...70 mm	51.5...103 mm
Detection range	0...76.5 mm	0...105 mm
Target width (EC80)	8 mm	8 mm
Target distance	1...3 mm	1...3 mm
Resolution	80 µm	80 µm
Repeat accuracy	±80 µm	±80 µm
Non-linearity	±300 µm	±400 µm
Ambient temperature range	–25...+85 °C	–25...+85 °C
Connection	M8 connector	M8 connector
Supply voltage	16...30 V	16...30 V
Housing material	PBT	PBT
Function indicator LED	Yes	Yes

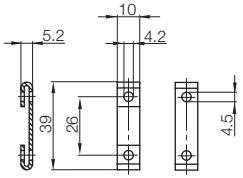
Please order **Metal Target** separately.
Type designation: BAM TG-XE-001
Ordering code: BAM01CP







Two fastening clips incl. screws
are included in the delivery.



IO-Link

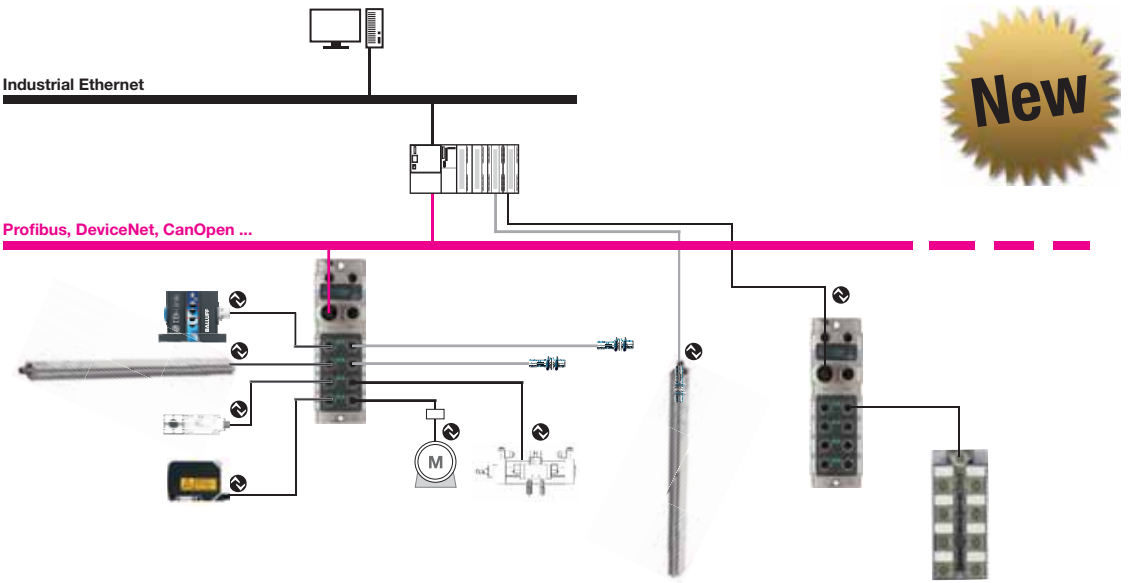
Contactless distance measurement technology with IO-Link

The Micropulse PF IO-Link is an absolute and contactless position measuring system that continuously provides measurements in µm in the 1-ms cycle. These measured values are directly transferred digitally via IO-Link.

IO-Link is a point-to-point connection within any network. An IO-Link system consists of an IO-Link device such as a sensor or actuator, an IO-Link master and the wiring. Master modules are available with all current field bus protocols. The Micropulse PF IO-Link device is coupled to the master via a maximum 20 m long standard sensor/actuator line. The Micropulse PF IO-Link works with the communication speed COM3 (230kB), which achieves a process data cycle of 1 ms with a 1.1 master. Via IO-Link, the user interface can be mapped based on an IODD (IO Device Description) in the engineering system. Due to the continuous flow of information, all data are centrally and consistently saved, so that a configuration is possible and reproducible at any time.

Your added value with the PF IO-Link profile

- Simple to configure, quick to install and bring into operation
- COM3, 1 ms process data cycle possible, securely measure quick movements
- OTF, automatic configuration in running operation (on the fly)
- Continuous monitoring and diagnostics
- High transfer rate, quick process data cycle
- Cost-effective to wire with standard M12 cable plug connector
- Easy to integrate in the controller via standard IO-Link modules or sensor hubs
- For the hard, industrial environment, use with IO-Link master component groups in IP 67 from Balluff



Micropulse Transducer BTL6 Profile PF IO-Link

Simple to configure, time-saving to install and bring into operation

Micropulse displacement systems enclosed in a profiled housing are non-contact, absolute measuring systems used for the precision measurement of distances. They are characterized by their very flat design and the robust structure with high IP 67 degree of protection. The current axis positions are "marked" by the position encoder magnets through the wall of the aluminum profile. These position measuring systems tolerate a lateral offset and a vertical offset of up to 15 mm.

Advantages and characteristics of the PF profile

- Very flat design for simple running over
- Non-contact detection of the actual position
- IP 67, insensitive to contamination
- Insensitive to shock and vibration
- Absolute output signal
- Measurement length up to 4570 mm
- 1 µm resolution
- Linearity deviation ± 200 µm
- Error and status LED

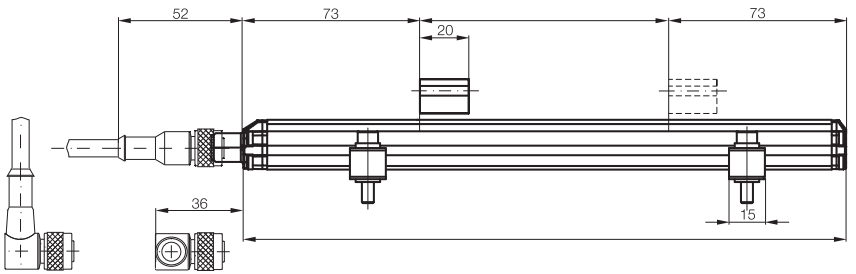
Ordering example:

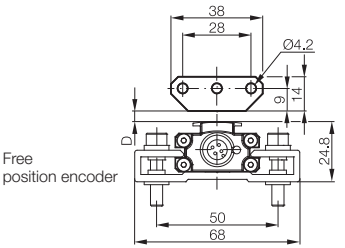
BTL6-U110-M_ _ _ _-PF-S4

IO-Link V1.1

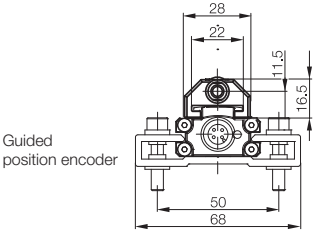
Nominal stroke [mm]
50-4570 mm in 5 mm steps

BLT6 profile PF transducer with free and guided position encoder and plug connection S4





Free
position encoder



Guided
position encoder

Micropulse position measuring systems BTL6-V11V- with VARAN real-time industrial Ethernet

VARAN real-time, hot plug, open, secure, cost-oriented!
Typical features of the open VARAN interface include rapid data transfer in real time with cycle times < 100 µs, automatic addressing, hot plug-ins, a high degree of reliability, low implementation costs as well as simple maintenance and faster service using appropriate service and diagnostic tools.

Ideal for drive technology
The hard and secure real-time data transmission makes VARAN increasingly into a standard in drive technology.

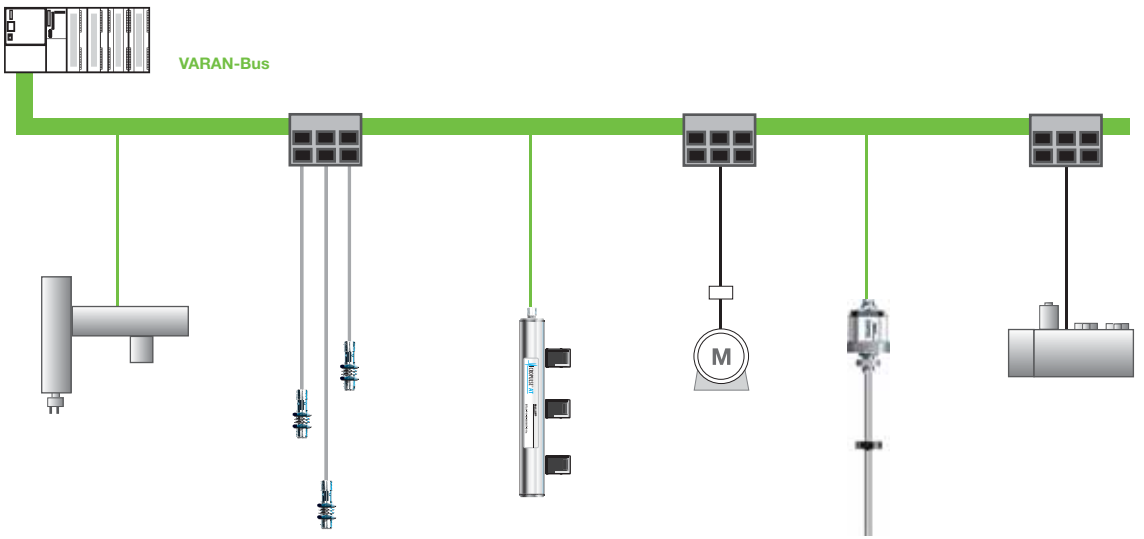
Reduction in material and installation costs
Particularly during installation, enormous costs can be saved in material and working times with the plug-in solution. And every plug connection saved means a significant source of errors is eliminated.

Additional information on VARAN real-time industrial Ethernet can be found at www.varan-bus.net

Information on compatible controllers and other hardware can also be found at http://www.sigmatek-automation.com/

VARAN advantages

- **Hard real-time**
  Cycle times < 100 µs, jitter < 100 ns
  Each command is immediately confirmed by the receiver.
- **High data integrity and error tolerance**
  Unacknowledged messages are repeated in the same bus cycle.
- **Flexible network topology**
  Modular machine structures: star, line and tree topologies can be combined any way you like.
- **Cost-effective**
  At the price level of a fieldbus connection, for which standard components are used for manager and client at a lower price.
- **Open standard**
  VARAN bus is an open standard and is manufacturer-independent.
- **Bus and power supply in one cable**
  Signal and power conduction with plug connector and hybrid cable
- **Hot plug capability**
  In running operation



Micropulse Position Measuring System BTL6-V11V Rod BZ

with VARAN real-time industrial Ethernet

New

VARAN feedback system for hydraulically controlled axes

With the Micropulse BTL6-V11V Rod, Balluff is putting the first integratable position measuring system with VARAN real-time industrial Ethernet on the market. Micropulse rod position measuring systems measure the actual piston position directly, integrated in the pressure area of the hydraulic cylinder. Optimal control quality of the hydraulic axis is achieved through dynamic, reproducible high-precision measurements. The extremely quick and secure real-time data transmission of the VARAN industrial Ethernets and the precise dynamic measurement of the piston positions of the micropulse BTLs makes the system ideal for the use in advanced applications with regulated axes.

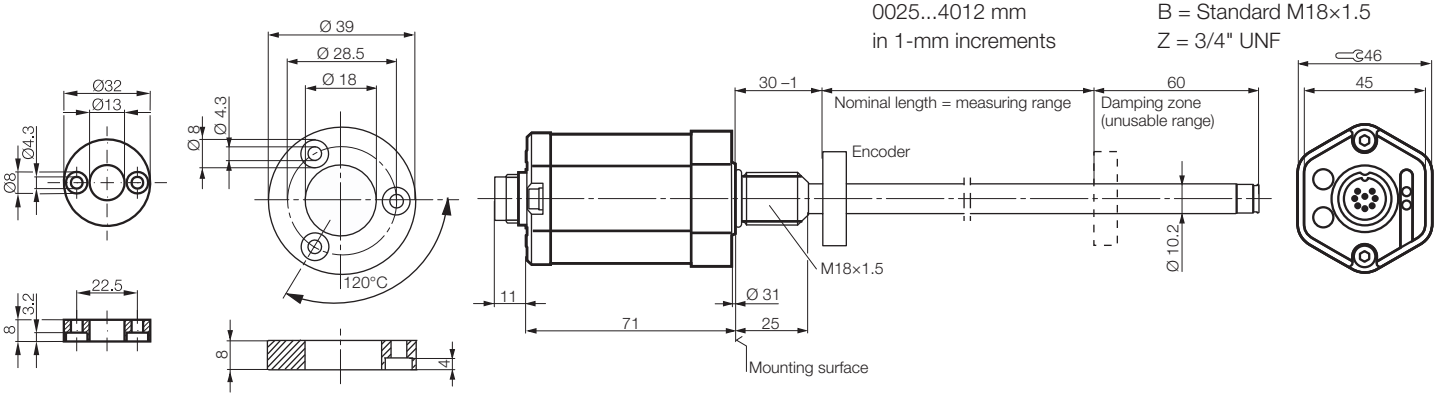
Features

- Non-contact detection of the actual position
- Pressure-resistant up to 600 bar (1000 bar) for direct integration in the pressure area
- IP 67, insensitive to contamination
- Insensitive to shock and vibration
- Absolute output signal
- Measurement length up to 4000 mm
- Fast, simple mounting
- Single-plug solution saves system costs
- 15 µm resolution
- Linearity deviation ± 200 µm

Ordering example:

BTL6-V11V-M _ _ _ _ -B-S115

Standard Nominal stroke [mm]	**Design**
0025...4012 mm in 1-mm increments	B = Standard M18×1.5 Z = 3/4" UNF



BTL-P-1013-4R **BTL-P-1013-3R**

The Rapid Replacement Module (RRM) option allows quick field replacement without removing the pressure tube from the hydraulic cylinder, making field-level maintenance fast and easy.

With the RRM option, the transducer electronics and sensing element can be replaced as a single unit, while the hydraulic seal remains intact.

- No hydraulic oil spillage, and no need for environmental containment
- No danger of hot oil spillage
- No need to bleed air from the hydraulic system after replacement
- No danger of hydraulic system contamination
- 100% exchange of sensor package eliminates troubleshooting guesswork
- Dimensionally identical to standard Balluff rod-style transducers
- Replacement cartridges can be installed into existing standard pressure tubes (consult Balluff Technical Support for guidance)
- Available for all BTL7 output types
- Available for all BTL7 connector types

RRM Rapid Replacement Module

Micropulse Transducers BTL 7
Rod-style with Rapid Replacement Module

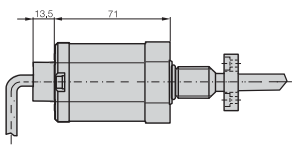
Ordering Information

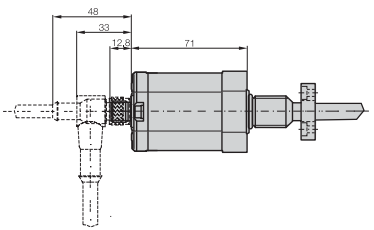
Complete Transducer		Replacement Electronics/Sensing Element (no pressure tube)
Part Number	Characteristics	
BTL7-xxxx-Mxxxx-**ZM**-xxxx *Example:* BTL7-A510-M0305-ZM-S115	3/4"-16 UNF threads, raised-face flange, 10.2 mm Ø pressure tube, 50.8 mm null point	BTL7-xxxx-Mxxxx-**ZR**-xxxx
BTL7-xxxx-Mxxxx-**ZN**-xxxx *Example:* BTL7-E500-M1829-ZN-S32	3/4"-16 UNF threads, flat-face flange, 10.2 mm Ø pressure tube, 50.8 mm null point	
BTL7-xxxx-Mxxxx-**BM**-xxxx *Example:* BTL7-S510-M1016-BM-KA05	M18 x 1.5 threads, raised-face flange, 10.2 mm Ø pressure tube, 30 mm null point	BTL7-xxxx-Mxxxx-**BR**-xxxx
BTL7-xxxx-Mxxxx-**BN**-xxxx *Example:* BTL7-S501B-M0305-BN-S115	M18 x 1.5 threads, flat-face flange, 10.2 mm Ø pressure tube, 30 mm null point	

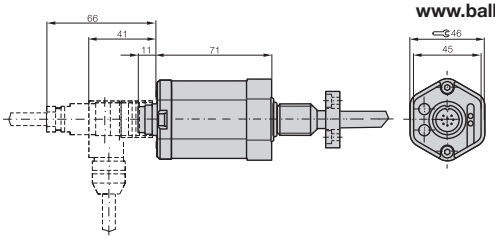
Pressure rated to 600 bar, high reproducibility, contactless, robust

The BTL Micropulse Transducer is the robust transducer system for use under extreme environmental conditions for measuring ranges between 25 and 7620 mm.

The actual measurement path is housed in a protected, high-pressure-rated stainless steel tube. The system is very well suited for use in hydraulic cylinders for position feedback or as fill-level monitoring in aggressive media in the food and chemical industries.







Series	BTL7 Rod
Shock rating	150 g/6 ms acc. to IEC 60068-2-27
Vibration	20 g, 10...2000 Hz acc. to IEC 60068-2-6
Reverse polarity protection	Yes
Overvoltage protection	Transzorb protection diodes
Dielectric strength	500 V AC (GND to housing)
Degree of protection per IEC 60529	IP 68 with cable outlet, IP 67 with screwed-on BKS-S... connector
Housing material	Al anodized/protective tube stainless 1.4571, flange stainless precision casting 1.3952
Fasteners	Style B thread M18×1.5, style Z 3/4”-16UNF
Pressure rating with 10.2 mm protective tube	600 bar if installed in hydraulic cylinder
Pressure rating with 8 mm protective tube	250 bar if installed in hydraulic cylinder
Connection type	Connector or cable connection
EMC tests:	
RF emission	EN 55016-2-3
Static electricity (ESD)	EN 61000-4-2 Severity level 3
Electromagnetic fields (RFI)	EN 61000-4-3 Severity level 3
Electrical fast transients (BURST)	EN 61000-4-4 Severity level 3
Surge voltage (SURGE)	EN 61000-4-5 Severity level 2
Conducted interference induced by high-frequency fields	EN 61000-4-6 Severity level 3
Magnetic fields	EN 61000-4-8 Severity level 4
Standard nominal lengths [mm] with 8 mm protective tube, the max. nominal length is 1016 mm	Up to 7620 mm in 1 mm increments

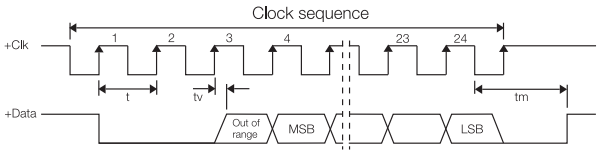
Please order USB communication box separately.

Attention!
Prior to construction, installation and commissioning, please observe the notices in the operating manual!
www.balluff.com

Micropulse Transducers BTL 7
SSI interface – Super linear and synchronized

- Scope of delivery:
  - Transducer
  - Condensed guide
- Please enter code for coding, system resolution, nominal length, style and connection type in the ordering code!

Series	BTL7 Rod Style
Output signal	Synchronous-serial
Interface transducer	**S**
Interface - customer device	Synchronous-serial
Part number – Standard asynchronous	BTL7-S5_ _-M_ _ _ _ - _ - _ _ _ _
Part number – Plus asynchronous	BTL7-S510-M_ _ _ _ - _ - _ _ _ _
Part number – Standard synchronous	BTL7-S5_ _**B**-M_ _ _ _ - _ - _ _ _ _
Part number – Plus synchronous	BTL7-S510**B**-M_ _ _ _ - _ - _ _ _ _
System resolution depending on model (LSB)	1, 2, 5, 10, 20, 40, 50 or 100 µm
Repeat accuracy	≤ 11 µm
Hysteresis	≤ 20 µm
Max. linearity deviation	±30 µm with 5 and 10 µm resolution or ≤ ± 2 LSB
Temperature coefficient, typical	≤ 15 ppm/K
Operating voltage, stabilized	10...30 V DC
Current draw	≤ 100 mA
Operating temperature	-40...+85 °C
Storage temperature	-40...+100 °C



Order example BTL7-S standard:

BTL7-S5_ _-M_ _ _ _ - _ - _ _ _ _ for asynchronous operation

BTL7-S5_ _B-M_ _ _ _ - _ - _ _ _ _ for synchronous operation

Coding	System resolution	Standard nominal length [mm]	Style	Connection type
0 Binary code, rising (24-bit)	1 1 µm	up to 7620 mm in 1 mm increments	Z = standard 3/4"-16 UNF	S32 connector
1 Gray code, rising (24-bit)	2 5 µm		B = metric M18 x 1.5	S115 connector
6 Binary code, rising (25-bit)	3 10 µm			KA02 PUR cable 2 m
7 Gray code, rising (25-bit)	4 20 µm			KA05 PUR cable 5 m
A Binary code, rising (26-bit)	5 40 µm			KA10 PUR cable 10 m
B Gray code, rising (26-bit)	6 100 µm			KA15 PUR cable 15 m
	7 2 µm			
	8 50 µm			

Order example BTL7-S Plus:

BTL7-S510-M_ _ _ _ - _ - _ _ _ _ for asynchronous operation

BTL7-S510B-M_ _ _ _ - _ - _ _ _ _ for synchronous operation

Standard nominal length [mm]	Style	Connection type
up to 7620 mm in 1 mm increments	Z = standard 3/4"-16 UNF	S32 connector
	B = metric M18 x 1.5	S115 connector
		KA02 PUR cable 2 m
		KA05 PUR cable 5 m
		KA10 PUR cable 10 m
		KA15 PUR cable 15 m

MICROPULSE®

Micropulse+ position measuring systems in a profile housing are non-contact, absolute measuring systems for accurately measuring one or more distances. They impress with their robust design including IP 67 high degree of protection, ease of installation, and wear-free measurement principle with high accuracy. The current axis positions are marked by the position encoder magnets through the wall of the aluminum profile. The position measuring systems tolerate a lateral offset as well as a height offset of up to 15 mm.

Features

- Non-contact detection of the measured position
- IP 67, insensitive to contamination
- Insensitive to shock and vibration
- Absolute output signal
- Measurement length up to 7620 mm
- Two measurement paths per system
- Error and status LED
- Quick commissioning through USB configuration

Micropulse+ position measuring systems guarantee high cost-effectiveness and quality in the manufacture of concrete blocks. In a concrete block machine, the Micropulse+ position measuring system simultaneously and reliably measures the axis position of load and molding stroke movement.

Micropulse⁺ Transducer BTL7 profile P

For precise position measurement in stringent environments

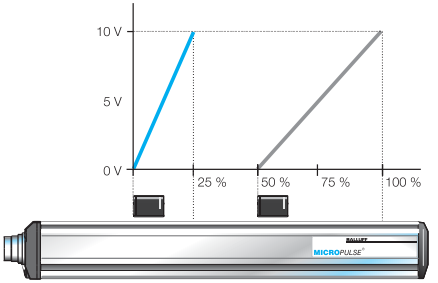
New

Added value with Micropulse⁺ additional functions

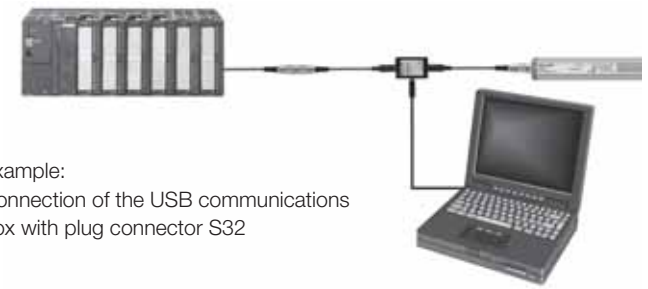
Great value is added for the user through a wide variety of additional functions of Micropulse⁺ profile P.

- Time savings through simple configuration and setting of the beginning and end points via USB interface and free "BTLConfigTool" software
- Universally configurable dual output functions, position and velocity
- Increased operating reliability with status LEDs for indicating the operating status and diagnostic information

Operating mode: Double position indicator



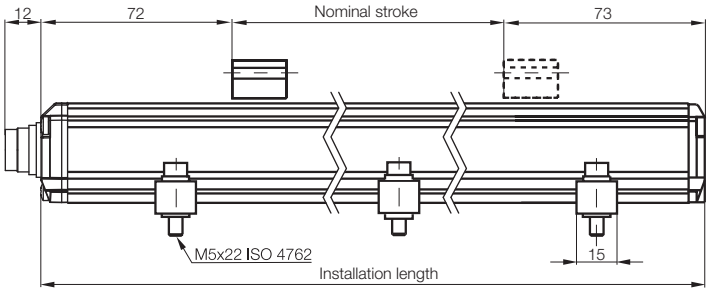
1 position measuring system, 2 movements, 2 output signals



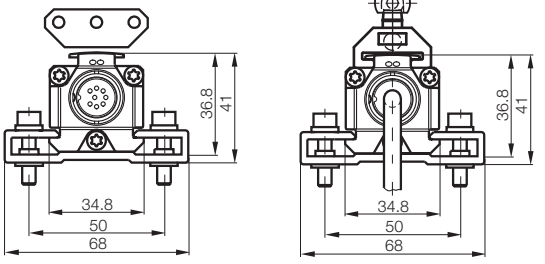
Example:
Connection of the USB communications box with plug connector S32

BTL7-P variants	
Part number	**Analog output signal**
BTL7-A501-M...-P-...	0...10 V and 10...0 V, –10...+10 V can be set via USB
BTL7-E501-M...-P-...	4...20 mA and 20...4 mA, 0...20 mA can be set via USB

BTL7 profile P transducer with free position encoder and plug connection S32

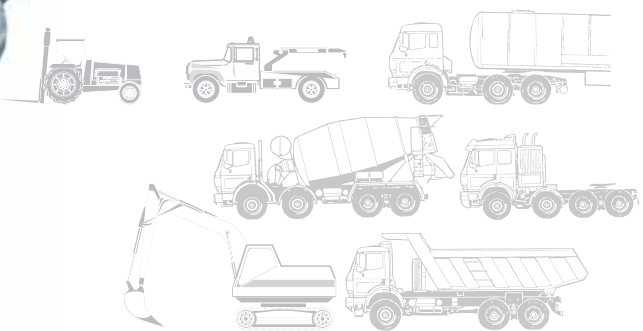


BTL7 profile P transducer with guided position encoder and cable output KA



Clever – the new integrated connector system ZA0 from Balluff
Ideal for hydraulic cylinders with rod eyes, where the Micropulse BTL AR is totally integrated in the cylinder and the hollow-bored piston rod. With the Standard 4-pin M12 connector, the screen connection is via a flange and union nut. An 8-pin M12 version will be available shortly.

Features
- Simple and fast installation that reduces costs
- Small design and integrative to save installation space
- Standard solution for Standard M12 connector
- Degree of protection IP 67
- Prefabricated complete solutions available



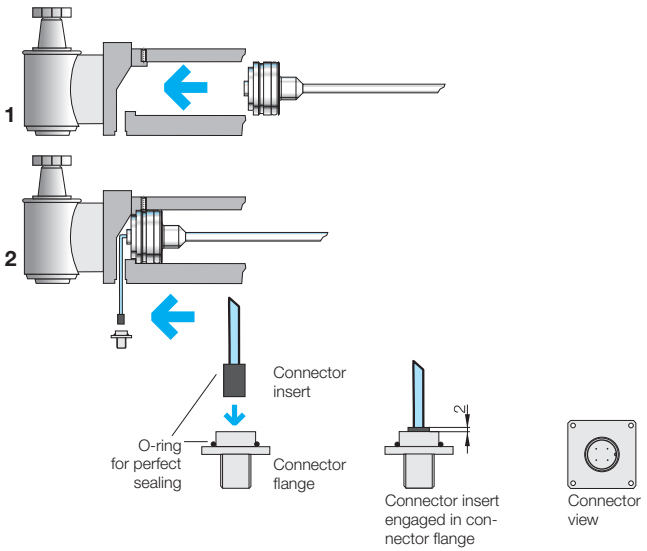
Thermosolar power stations

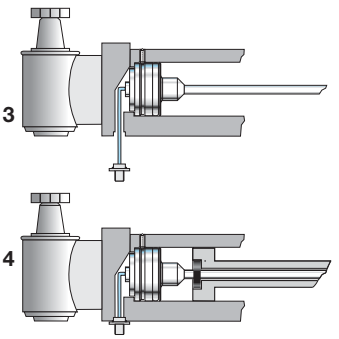
Micropulse Transducers BTL AR ZA0

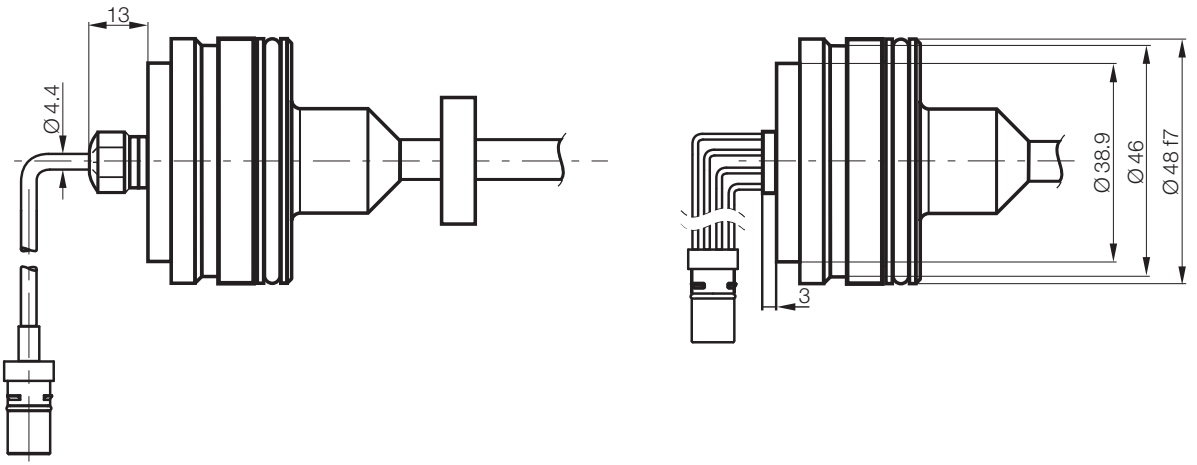
ZA0-M12 integrated connector system, fast and simple installation

A simple "click" and the IP 67 plug-in connector is ready
Push the distance measurement system Micropulse AR into the hydraulic cylinder. Insert the connector insert into the connector flange (1), let it click (2), secure the connector flange (3) and the IP 67 connector (4) is ready.

Model	
BTL6-A/B/E-...-M...-E-**KA-ZA0_**	Connector system for transducers with cable outlet
BTL6-A/B/E-...-M...-E-**LA-ZA0_**	Connector system for transducers with strand outlet







Fluid Sensors

Pressure Sensors
Capacitive Sensors for Level Detection
Fork Sensors for Fluid Detection
Micropulse Filling Level Sensor

Pressure Sensors BSP

For a wide variety of applications in factory automation

New

Balluff pressure sensors offer an impressive price/performance ratio and are suitable for a wide variety of applications in factory automation. With their large display and a simple operating concept in accordance with VDMA, they are simple and quick to configure. Additionally, Balluff pressure sensors can be installed flexibly and in a space-saving manner. The display and electrical output can be turned independent of the flange. Other features of these versatile sensors include:

- A compact housing design
- IO-Link
- Local pressure display
- Digital switching outputs
- Analog output signals
- optional –40 °C

Refer to our BSP pressure sensor brochure or visit **www.balluff.com** for further information

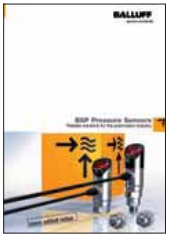
Pressure ranges		**–1...2 bar, –1...10 bar, 0...2 bar, 0...5 bar, 0...10 bar, 0...20 bar, 0...50 bar, 0...100 bar, 0...250 bar, 0...400 bar, 0...600 bar**
Supply voltage U_B		18...36 V DC
Switching frequency f max.		200 Hz
Accuracy		≤ ±0.5 % FSO BFSL
Temperature error		≤ ±0.3 % FSO/10 K
Ambient/material temperature		**–25…+85 °C/–25...+125 °C optional –40 °C** (in addition to the standard temperature range)
Degree of protection as per IEC 60529		IP 67 (when connected)
Material	Housing	PA 6.6, stainless steel
	Measuring cell	Ceramic
	Seal	Fluoroelastomer
Connection	Connectors	M12 connector, 4-pin
	Process connection	G 1/4"

Balluff pressure sensors with a flush-mounted membrane are designed for media in which standard pressure sensors are at their limits. With their flush-mounted, welded stainless steel membrane, the sensors have no dead spaces and can be cleaned particularly well. Due to this, they are excellently suited to pressure measurement in viscous, crystallized or media-containing solids – for example:

- Adhesives
- Oils
- Sealant
- Changing media

New

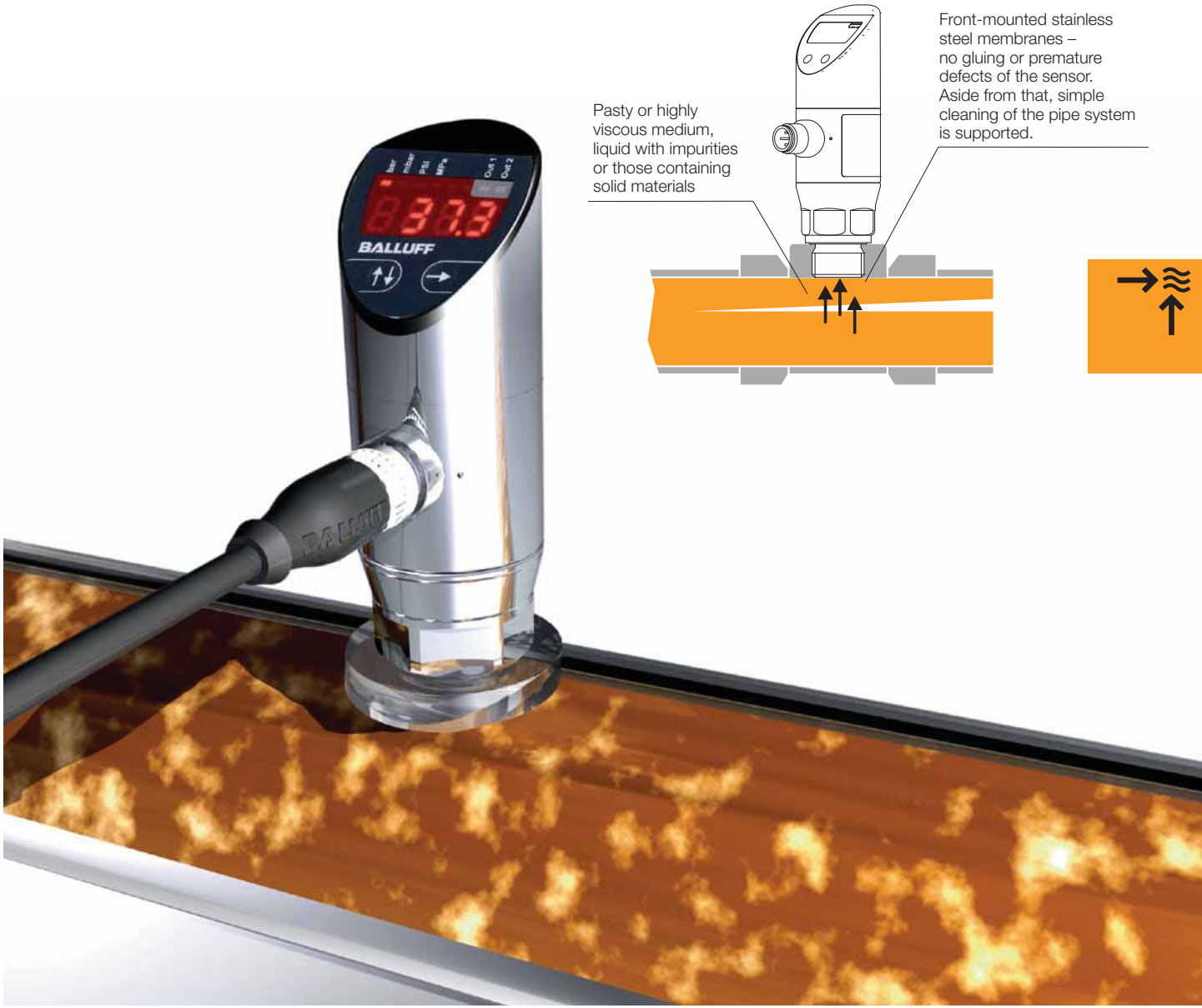
Pressure ranges		**–1...2 bar, –1...10 bar, 0...2 bar, 0...5 bar, 0...10 bar, 0...20 bar, 0...50 bar, 0...100 bar, 0...250 bar, 0...400 bar, 0...600 bar**
Supply voltage U_B		18...36 V DC
Switching frequency f max.		200 Hz
Accuracy		≤ ±0.5 % FSO
Temperature error		≤ ±0.2 % FSO/10 K
Ambient/media temperature		**–40…+85 °C/–40...+125 °C**
Degree of protection as per IEC 60529		IP 67 (when connected)
Material	Housing	PA 6.6, stainless steel
	Membranes	Stainless steel 1.4435
	Seal	Fluoroelastomer
Connection	Connector	M12 connector, 4-pin
	Process connection	G 1/2", flush-mounted



Refer to our BSP pressure sensor brochure or visit **www.balluff.com** for further information

Flush-mounted Pressure Sensors BSP

For media at which standard pressure sensors reach their limit


Pasty or highly viscous medium, liquid with impurities or those containing solid materials
Front-mounted stainless steel membranes – no gluing or premature defects of the sensor. Aside from that, simple cleaning of the pipe system is supported.
BALLUFF

The new capacitive SmartLevel sensors in the Uniflat design detect conductive media through non-metallic container walls with a thickness up to 10 mm extremely reliably. With a well-conceived fastening design, they can be screwed on or secured with cable ties to bypass pipes.

The connection is made using a 2 m connection line or a short pigtail line and an M8 plug. The codable output function provides PNP or NPN and normally open or normally closed functionality.

- Simple cable tie assembly on pipes
- Compensates for foam and residual material
- Regular cleaning can be omitted

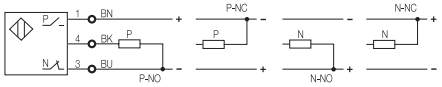
SMARTLEVEL

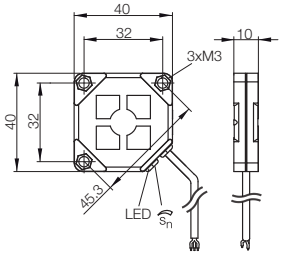
Capacitive Sensors BCS

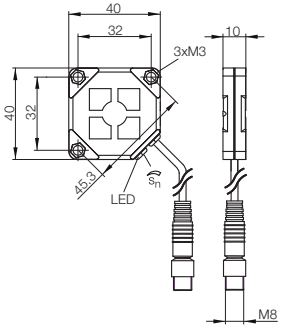
The new 40×40 mm sensor – also available as SmartLevel

Size		**40×40×10 mm** Uniflat	**40×40×10 mm** Uniflat
Installation type		flush	flush
Rated switching distance s_n		**media-dependent**	**media-dependent**
PNP/NPN and normally open/ normally closed cod able	**Ordering code**	**BCS00TP**	
	Part number	BCS Q40BBAA-GPCFAC-EP02	
PNP normally open	**Ordering code**		**BCS00U8**
	Part number		BCS Q40BBAA-PSCFAC-EP00,3-GS49
PNP normally closed	**Ordering code**		**BCS00U7**
	Part number		BCS Q40BBAA-POCFAC-EP00,3-GS49
Supply voltage U_B		10...30 V DC	10...30 V DC
Voltage drop U_d at I_e		2.5 V	2.5 V
Rated insulation voltage U_i		75 V DC	75 V DC
Output current max.		100 mA	100 mA
No-load supply current I_0 max.		11 mA	11 mA
Polarity reversal/short-circuit protected		yes/yes	yes/yes
Ambient temperature T_a		–5...+85 °C	–5...+85 °C
Switching frequency f		10 Hz	10 Hz
Output function/power-on indicator		yes/yes	yes/yes
Degree of protection as per IEC 60529		IP 67	IP 67
Material	Housing	PBT	PBT
	Sensing surface	PBT	PBT
	Cover	PBT	PBT
Connection		2 m PUR cable, 3×0.14 mm²	0.3 m PUR cable with M8 plug, 3-pin

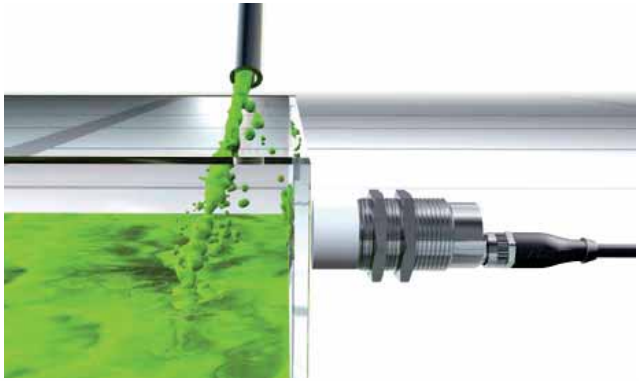
Wiring diagram



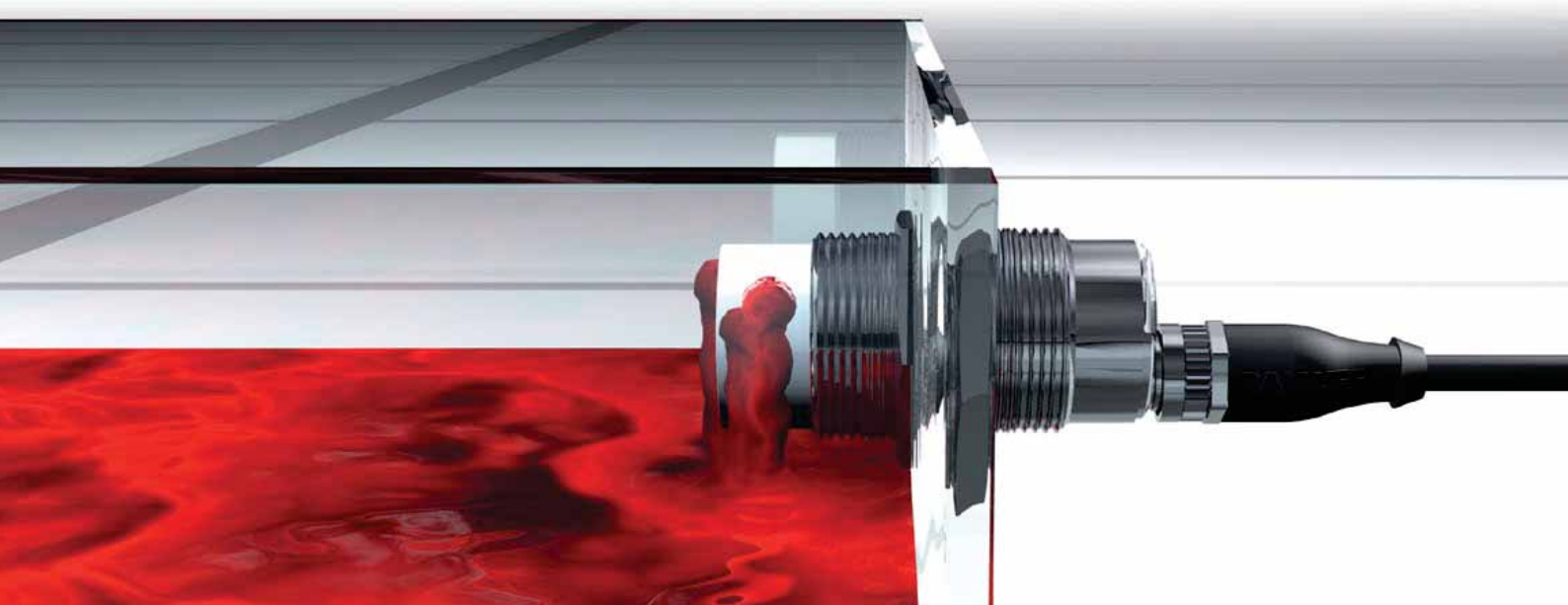




- Detecting high-conductive acids, such as sulfuric or hydrochloric acid, through plastic or glass containers that are up to 20 mm thick
- Reliable detection of fill levels in food items, such as ketchup or mustard, despite heavy buildup
- Detecting concentrated cleaning agents in plastic containers



Industrial wastewater (depending on conductivity of the medium)		
Disinfectants (media containing chlorine)		
Table salt solution		
Rinsing agents		
Milk/buttermilk/yogurt		
Fruit juice		
Coolant/lubricants		Ketchup/mustard
Formic acid (30 %)		Phosphoric acid (10 %)
Vinegar		Sulfuric acid (10 %)
Cola		Calcium chloride (30 %)
Honey/glue	Blood	Hydrochloric acid (40 %)
Beer	Seawater	Nitric acid (12 %)
SMARTLEVEL 15 approx. 0.7...15 mS	**SMART**LEVEL 50 approx. 15...50 mS	**SMART**LEVEL 500+ approx. 50...500 mS and greater



Capacitive Sensors SMARTLEVEL 500+

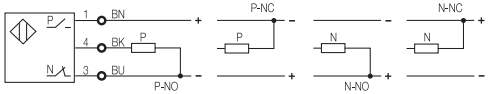
Progress in smart level technology

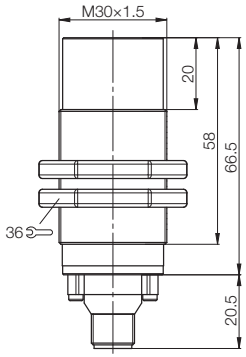
SMARTLEVEL 500+

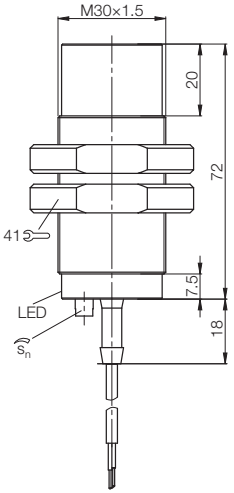
SMARTLEVEL 500+

Size		**M30×1.5**	**M30×1.5**
Installation type		Non-flush	Non-flush
Rated switching distance s_n		**media-dependent**	**media-dependent**
PNP/NPN and normally open/ normally closed user codable	**Ordering code**	**BCS00HJ**	**BCS00TZ**
	Part number	BXS M30T4M3-GPCFVG-S04G	BCS M30TTH2-GPCFVG-AT02
Supply voltage U_B		10...30 V DC	10...30 V DC
Voltage drop U_d at I_e		≤ 2 V	≤ 2 V
Rated insulation voltage U_i		75 V DC	75 V DC
Output current max.		100 mA	100 mA
No-load supply current I_0 max.		< 15 mA	< 15 mA
Polarity reversal/short-circuit protected		yes/yes	yes/yes
Ambient temperature T_a		–10...+60 °C	–10...+60 °C
Switching frequency f		5 Hz	5 Hz
Supply voltage/output function indicator		Green LED/yellow LED	no/red LED
Degree of protection as per IEC 60529		IP 64, connection side IP 67	IP 67
Material	Housing	V2A	PTFE (Teflon)
	Sensing surface	PTFE (Teflon)	PTFE (Teflon)
	Cover	PBT/PE	PTFE (Teflon)
Connection		M12 connector, 4-pin, A-coded	2 m PTFE cable, 3×0.2 mm²

Wiring diagram







- Detect fluids with a water content > 15 %
- Detection independent of color
- Thin deposits can be masked

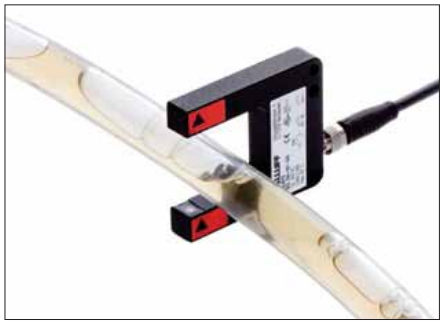
Balluff has widened its scope of expertise in through-beam fork sensors by offering sensors for fluid detection. The through-beams with fork openings of 30 mm and 80 mm are suitable for detecting the level of clear, colored or turbid fluids with a water content > 15 % through transparent container walls. Balluff offers a solution for applications where other sensors reach their limits. For example, with this through-beam fork sensor, you can identify hydrous liquids even in small, transparent hoses.

Fork Sensors for Fluid Detection

Reliable level detection through transparent container walls

Ordering code / Part number		BGL003J BGL 30A-011-S49	BGL003K BGL 30A-012-S49	BGL003L BGL 80A-011-S49	BGL003M BGL 80A-012-S49
Switching output	PNP	■		■	
	NPN		■		■
Switching type	NC/NO selectable	■	■	■	■
Connection	M8 connector, 3-pin	■	■	■	■
Fork opening	30 mm	■	■		
	80 mm			■	■
Light type		Infrared			
Switching frequency		2 kHz			
Degree of protection		IP 67			
Housing material		Gd-Zn			
Optical surface		Glass			

For additional information visit our website at **www.balluff.com**



- Continuously precise measurement in µm range delivers excellent filling results
- 100 % stainless steel ensures top hygiene standards and long service life
- International certificate guarantees maximum quality

Maximum precision for food hygiene – internationally certified

The BTL-SF filling level sensor ensures continuously precise measurement in applications that demand extreme hygiene. Made from corrosion-free stainless steel with excellent surface quality and rounded edges, the sensor meets the highest international hygiene standards and fulfills all strict requirements of the food industry. Take advantage of the best quality directly from the manufacturer.

Other benefits

- Neutral for all liquids
- Compensates for foam to deliver reliable filling level values
- Adjustment-free installation
- Easy to clean in installed state (CIP – Clean in Place)
- For process temperatures up to 130 °C (SIP – Sterilization in Place)
- Standardized interfaces ensure flexible installation
- Internationally certified quality guarantees global marketing and sales of your system
- Rising and falling signal available

ECOLAB

EHEDG

FDA

3 74-03

Micropulse BTL-SF Filling Level Sensor

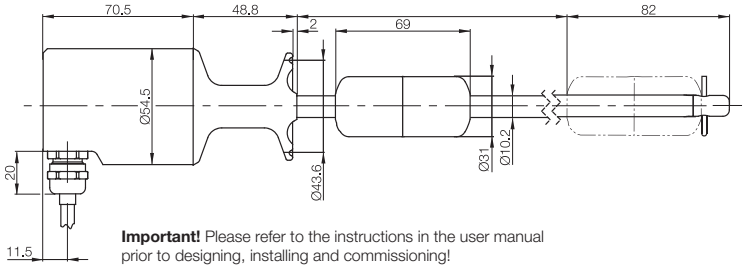
Maximum precision for foodstuffs and hygiene

IP69K

3A 74-03

FDA and EHEDG compliant

Model	BTL5 rod SF
Interface transducer	analog
Interface - customer device	analog
Ordering code	**BTL5-...-M_ _ _ _-SF-F_ _**
Reverse polarity protected	Yes
Overvoltage protected	36 V
Dielectric constant	500 V (GND to housing)
Degree of protection per IEC 60529	IP 67/IP 69K (flange and tube)
Housing material	Stainless steel 1.4404
Flange and tube material	1.4404
Connection	Cable connection
Mounting	1.5" Tri Clamp as per SSI 3A standard 74-03
Pressure rating	300 bar (depending on float)
Standard nominal length (mm)	0025, 0050, 0075, 0100, 0125, 0150, 0175, 0200, 0225, 0250, 0275, 0300, 0325, 0350, 0375, 0400, 0425, 0450, 0475, 0500, 0550, 0600, 0650, 0700, 0750, 0800, 0850, 0900, 0950, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2250, 2500 or in 5 mm increments on request

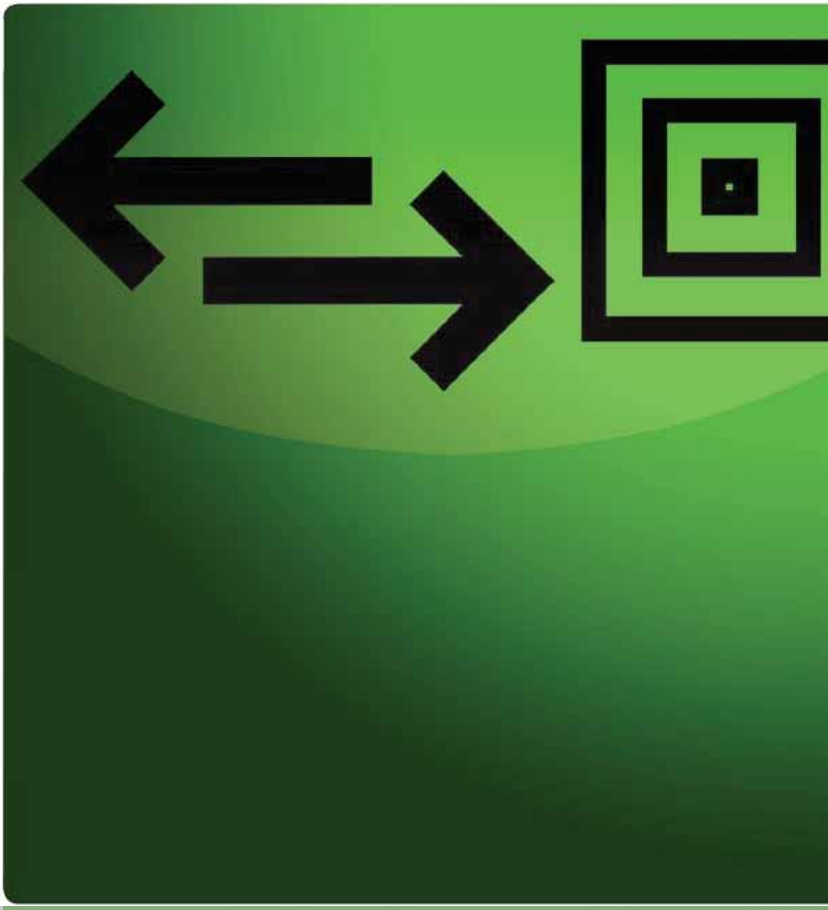


Important! Please refer to the instructions in the user manual prior to designing, installing and commissioning!

Refer to our Micropulse transducer brochure or visit **www.balluff.com** for more detailed information

Industrial Identification

Vision Sensors
Industrial RFID Systems



Inspection and read processes for vision sensors can be impaired by changing ambient light. Simultaneously, employees and technicians are often bothered by the pulsing light of normal vision sensors. But you do not have to have such problems.
Because the BVS-E vision sensor with infrared lighting and integrated light filter prevents this in advance.
Its light is invisible to the human eye, so that it can't bother the operator. And its integrated light filter ensures that most ambient light cannot get in. This increases the read quality and the reliability of the inspection, so that process reliability also increases.

- Invisible light, which does not bother your employees
- Integrated light filter for increased process reliability
- Simple to replace due to fixed integrated lighting, optics and filters
- 10% higher light intensity than comparable red light sensors
- Safe for the eyes, certified for CE (EN 62471:2008)

Series		
Lens, focal length		
PNP, **standard**	**Ordering code**	
	Part number	
PNP, **advanced**	**Ordering code**	
	Part number	
PNP, **identification**	**Ordering code**	
	Part number	
Supply voltage U_B		
Interface		
Configuration interface		
Type detection rate		
Working range		
Working distance, Field of view (horizontal × vertical)		
Lighting		
Eye safety acc. to IEC 62471		
Degree of protection as per IEC 60529		
Connection		

The integrated light filter provides secure code reading: in normal light conditions, …

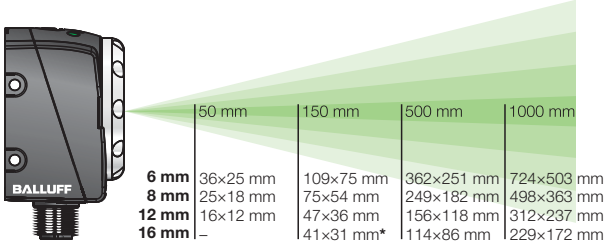
… but also with interference from ambient light. The sensor works reliably, the process reliability is increased.

Vision Sensors BVS-E, Infrared

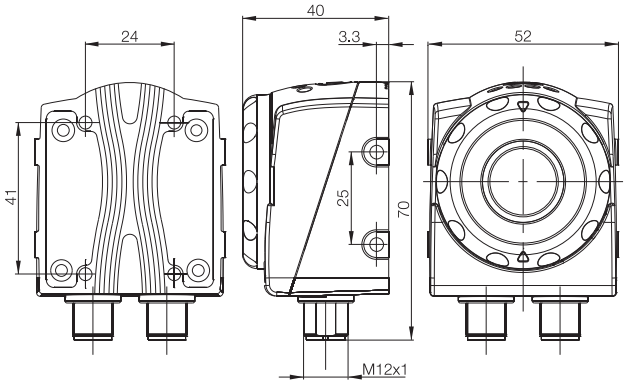
Invisible – with safety

	BVS-E		**BVS-E**		**BVS-E**		**BVS-E**
	Standard lens, **6 mm**		Standard lens, **8 mm**		Telephoto lens, **12 mm**		Telephoto lens, **16 mm**
	BVS0013		**BVS0014**		**BVS0012**		
	BVS OI-3-105-E		BVS OI-3-101-E		BVS OI-3-103-E		
	BVS0016		**BVS0015**		**BVS0017**		**BVS0018**
	BVS OI-3-155-E		BVS OI-3-151-E		BVS OI-3-153-E		BVS OI-3-157-E
	BVS001C		**BVS0019**		**BVS001A**		**BVS001E**
	BVS ID-3-105-E		BVS ID-3-101-E		BVS ID-3-103-E		BVS ID-3-107-E
	24 V DC ±10 %		24 V DC ±10 %		24 V DC ±10 %		24 V DC ±10 %
	RS232 (only identification)		RS232 (only identification)		RS232 (only identification)		RS232 (only identification)
	Ethernet 10/100 Base T		Ethernet 10/100 Base T		Ethernet 10/100 Base T		Ethernet 10/100 Base T
	3...15 Hz (depending on evaluation function)		3...15 Hz (depending on evaluation function)		3...15 Hz (depending on evaluation function)		3...15 Hz (depending on evaluation function)
	50...1000 mm		50...1000 mm		50...1000 mm		180...1000 mm
	50 mm, 36×25 mm	1000 mm, 724×503 mm	50 mm, 25×18 mm	1000 mm, 498×363 mm	50 mm, 16×12 mm	1000 mm, 312×237 mm	180 mm, 41×31 mm	1000 mm, 229×172 mm
	LED (Infrared), can be disengaged		LED (Infrared), can be disengaged		LED (Infrared), can be disengaged		LED (Infrared), can be disengaged
	Free group		Free group		Free group		Free group
	IP 54		IP 54		IP 54		IP 54
	2× M12 connectors (8 and 4 pin)		2× M12 connectors (8 and 4 pin)		2× M12 connectors (8 and 4 pin)		2× M12 connectors (8 and 4 pin)

To define the field of view and working distance, use the distance calculator at:
www.balluff.com



***** Working range 180 to 1000 mm



Check the marking on your products. Regardless of whether you label them with 1D codes (bar codes) or 2D codes (data Matrix codes), the BVS reads all common codes on the market. Text and sequences of numbers such as code plain text can be verified using OCV. The result: "*Inspection OK*" or "*Inspection not OK*".
If you need to view the read code data to find out which parts are being processed, you can output it via the RS232 or Ethernet interface.

- Simple operation
- Read several codes in an inspection simultaneously
- Output code data via RS232 or Ethernet interface
- Verify character strings
- Codes readable in any position
- Extensive range of accessories

Readable bar codes
- Interleaved 2-of-5
- Code 39
- Code 128
- Pharmacode
- Codabar
- EAN 8
- EAN 13
- UPC-E
- PDF 417

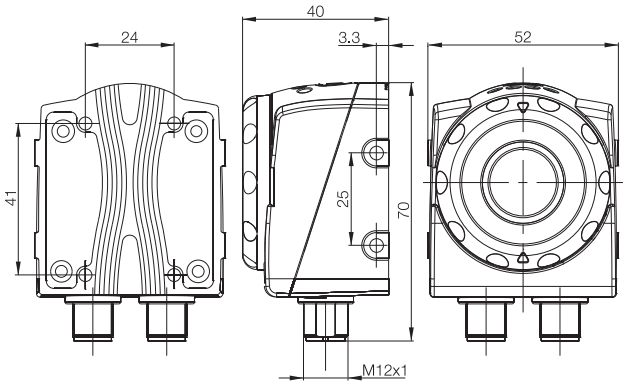
Readable Data Matrix codes
- ECC 200

Vision Sensors BVS-E Identification

Detecting and identifying varied codes

Series		BVS-E Identification	BVS-E Identification	BVS-E Identification
Lens, focal length		Standard lens, **8 mm**	Telephoto lens, **12 mm**	Telephoto lens, **16 mm**
PNP	**Ordering code**	**BVS0001**	**BVS000T**	**BVS000Y**
	Part number	BVS ID-3-001-E	BVS ID-3-003-E	BVS ID-3-007-E
Supply voltage U_B		24 V DC ±10 %	24 V DC ±10 %	24 V DC ±10 %
Switching inputs		1× Trigger, 1× Select	1× Trigger, 1× Select	1× Trigger, 1× Select
Switching outputs		1× lighting synchron., 1× PNP	1× lighting synchron., 1× PNP	1× lighting synchron., 1× PNP
Interface		RS232	RS232	RS232
Configuration interface		Ethernet 10/100 Base T	Ethernet 10/100 Base T	Ethernet 10/100 Base T
Typ. detection rate		3...15 Hz (depending on evaluation function)	3...15 Hz (depending on evaluation function)	3...15 Hz (depending on evaluation function)
Working range		50...1000 mm	50...1000 mm	150...1000 mm
Working distance, Field of view (horizontal×vertical)		50 mm, 25×18 mm / 1000 mm, 500×360 mm	50 mm, 16×12 mm / 1000 mm, 312×237 mm	150 mm, 34×26 mm / 1000 mm, 229×172 mm
Illumination		LED, incident light (red), deselectable	LED, incident light (red), deselectable	LED, incident light (red), deselectable
Eye safety per IEC 62471		Free group	Free group	Free group
Connection		2 connectors M12 (8- and 4-pin)	2 connectors M12 (8- and 4-pin)	2 connectors M12 (8- and 4-pin)
Degree of protection per IEC 60529		IP 54	IP 54	IP 54

To define the field of view and working distance, use the distance calculator at:
www.balluff.com



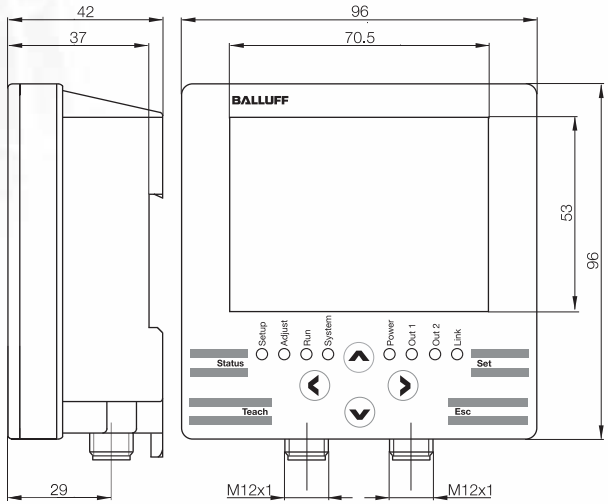
- Simple, self-explanatory operation
- Can be retrofitted on all existing sensors
- Clearly arranged presentation of process statistics and sensor results
- Access for operators, setters and administrators can be controlled by passwords
- Memory for 20 inspections
- Connection to sensor via direct link or network (TCP/IP)

Do you want to see what the sensor sees? You wish to increase your inspection quality with the use of statistical values? And to simply adapt your inspection to changes in components? We have a simple solution: the Vision Sensor Monitor.
It visualizes the sensor images and inspection results and displays the process statistics in a simple overview graphic. The detection of unwanted deviations thus becomes really simple. If an inspection feature changes, such as a sell-by date, authorized users can then adapt the inspection criteria even without a PC. Lengthy setting work is therefore no longer necessary. The monitor allows simple switching between two inspections. The easy-to-use, intuitive user interface of the monitor can be controlled by operating buttons and is available in multiple languages.

Vision Sensor Monitor BVS-E

See what the sensor sees

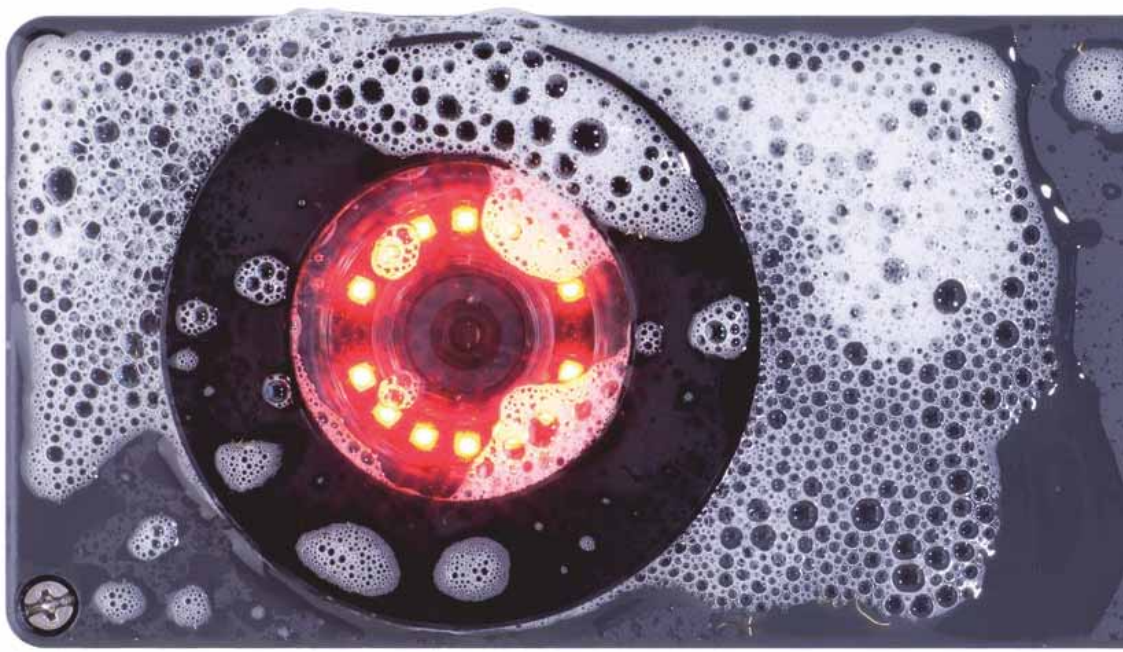
Model		Vision Sensor Monitor
Type		BVS-E
PNP	**Ordering code**	**BAE00EH**
	Part number	BAE PD-VS-002-E
Supply voltage U_B		24 V DC ±10 %
Dimensions		96×96×42.4 mm
Connection		2× M12 connector, 4-pin
Degree of protection per IEC 60529		IP 40
Ambient temperature T_a		–10...+55 mm
Display		3.5“ color LCD



Available accessories:

- 2 m connecting cable
  BCC M415-0000-1A-004-PX0334-020 **Ordering code: BCC030A**
- 5 m connecting cable
  BCC M415-0000-1A-004-PX0334-050 **Ordering code: BCC030C**
- 2 m connecting cable, monitor/sensor
  BCC M415-M415-5D-687-ES64N8-020 **Ordering code: BCC0ANA**
- 5 m connecting cable, monitor/sensor
  BCC M415-M415-5D-687-ES64N8-050 **Ordering code: BCC0ANC**
- 5 m Ethernet cable, monitor/RJ45
  BKS-AD-05-RJ45/GS180-05 **Ordering code: BCC02H1**
- 10 m Ethernet cable, monitor/RJ45
  BKS-AD-05-RJ45/GS180-10 **Ordering code: BCC02H2**
- Monitor protective housing
  BAM PC-AE-002-1 **Ordering code: BAM01A8**

BALLUFF
VISION SENSOR IP67+
BALLUFF
VISION SENSOR IP67+



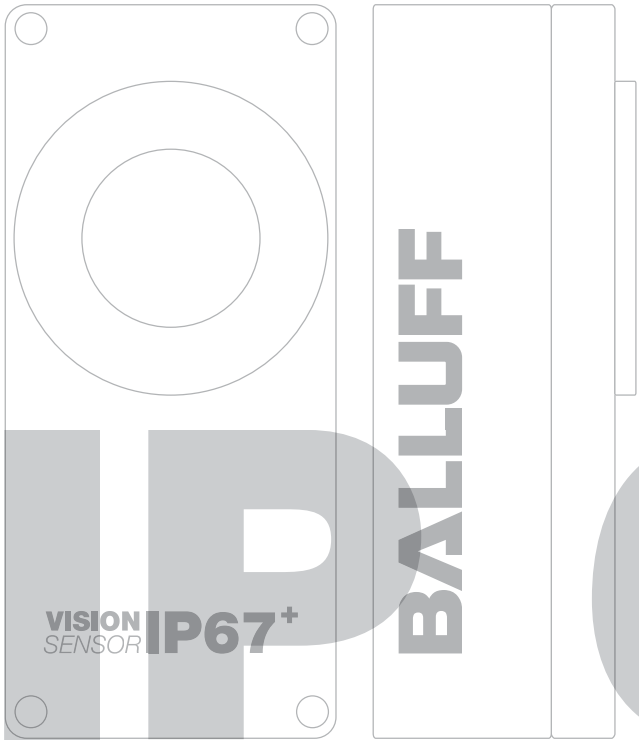
Degree of Protection IP 67+, Inexpensive Retrofit

Optional housing for Vision Sensors BVS

- Rugged housing
- Degree of protection IP 67+
- Flexible handling
- Simply assembly and mounting
- Full range of sensor functions
- Inexpensive acquisition

Balluff now provides an optional housing for splash water areas and other problematic environments for all sensors in the Vision Sensor family. With its IP 67+ protection, it also provides safe protection during long-term use in harsh environments. With a few simple hand movements, the sensor is easily integrated in the robust housing and then mounted on a machine or system. All functions are then available as usual without any loss.

Description	Protective housing BAM for Vision Sensors BVS
Ordering code	**BAM01RR**
Part number	BAM PC-VS-008-1
Dimensions	175×80×62 mm
Mounting	M4 screws (163×52 mm)
Connection	Screwed cable gland M25×1.5 (1× Ø 5 mm, 1× Ø 6 mm)
Degree of protection per IEC 60529	IP 67
Housing material	Cast aluminum, lacquered
Optical surface	Anti-reflective glass



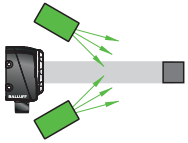
Coaxial Lighting
For highly reflective surfaces

New

- Long service life
- Homogeneous lighting
- Higher standard of quality
- Energy-saving LED technology

Coaxial lighting is the optimal solution for lighting strongly reflective surfaces. Therefore, coaxial lighting is well suited for transmitted light inspections of colored materials and for inspections of printed or dirty surfaces. They are low maintenance, industrially sound and thus can be integrated with low effort.

Series	Coaxial lighting, red light	Coaxial lighting, red light
Ordering code	**BAE00J9**	**BAE00JA**
Part number	BAE LX-VS-OR50	BAE LX-VS-OR100
Supply voltage U_B	24 V DC	24 V DC
Operating current	218 mA	600 mA
Light field size	50×50 mm	100×100 mm
Emitter, light type	LED, red light	LED, red light
Wavelength	630 nm	630 nm
Dimensions	106×67×57 mm	150×108×110 mm
Connection	M8, 2-pin	M8, 2-pin
Housing material	Anodized aluminum	Anodized aluminum
Weight	450 g	1500 g
Degree of protection as per IEC 60529	IP 54	IP 54
Polarity reversal protected	yes	yes
Short-circuit protected	yes	yes
Ambient temperature range T_a	–10…+55 °C	–10…+55 °C
Storage temperature range	–25…+75 °C	–25…+75 °C



Coaxial lighting is used if the industrial image processing requires diffused light to, for example, homogeneously illuminate highly reflective surfaces and prevent reflection.

3D sensor holder with quick-change plate
The 3D sensor holder with quick-change plate for industrial image processing from Balluff is a novelty on the market. Originally conceived for vision sensors, the multi-talent can also hold other sensors of similar size. To do so, you only have to exchange the sensor-specific change plate. The first holders are already successfully in use in the automotive industry.

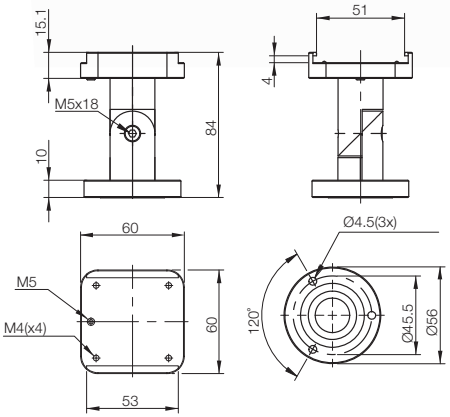
The robust holder made of anodized aluminum has three independent axes of rotation, which can be used to set any desired solid angle and thereby precisely align the sensor. The special attraction is that the position is maintained even if the sensor is exchanged or temporarily removed from the system for a cleaning procedure. That helps minimize downtimes. It is enough to remove the sensor with the quick-change plate from the holder. An optionally used safety screw provides protection from tampering as needed. Without the correct tool, the sensor cannot be removed.

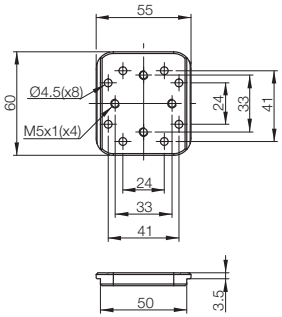
The industry-sound holder made of anodized aluminum draws attention with its particularly simple and practical handling. Thus the holder fits not only on nearly all common installation profiles, such as from item and Bosch, etc., but it can also be fastened directly to machine frames, to a worktop, or, even to a pallet with three holes. Because the user can install foot, plate and holders separately, they have a lot of freedom for design. Particularly enjoyable: This holder is also still fully compatible with universal Balluff BMS Installation System, with which nearly every mounting task can be handled with a few standard elements to be solved flexibly. The holder and change plate can be purchased separately from the manufacturer.

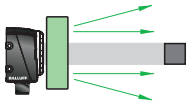
Special properties:
- Quick selection
- Exact alignment
- Stable, robust holder systems
- Simple handling

3D Holder System

With unique quick-change plate







Description	3D holder system
Use	Holder for quick-change plate
Ordering code	**BAM01YT**
Part number	BMS CUJ-M-S25-D045-00
Material	Anodized aluminum

Description	Quick-change plate
Use	3D holder system for BUS
Ordering code	**BAM01YP**
Part number	BMS CS-M-S25-DX15-00
Material	Anodized aluminum

Background lighting: With the through beam method, the background lighting is positioned behind the object you wish to detect. The Vision Sensor only detects the outline of the object based on this position. Partial measurements or sizes can be well checked in this manner. Ambient light also presents no problems. Changes to the surface (markings, color, etc.) can be suppressed almost completely and have no influence on the test result.
Our background lights are particularly bright and versatile. They are also very suitable as diffuse incident lights to illuminate highly reflective components. Due to the extremely flat design, they are ideal for use in applications with limited space.

Spotlights with IP 67 Protection

Can be used universally – red light and infrared

Special properties:

- IP 67 degree of protection
- Versatile in application and can be used universally
- Energy-saving LED technology
- Red light and infrared variants available
- Space-saving M18 and M30 designs
- Precision illumination, even from a great distance

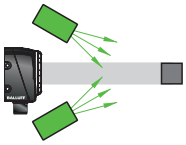
The requirements are particularly demanding if the operational environment is particularly harsh. Spotlights in the housing with the IP 67 form of protection, which Balluff is the first to offer, are the right lights for the job. The extremely robust versions in the space-saving sizes M18 and M30 are also characterized not only by their low power consumption but also by their powerful and evenly distributed light spot in red light and infrared variants.

CE

Series	M18 spotlight, Infrared	M30 spotlight, Infrared
Ordering code	**BAE00H1**	**BAE00H2**
Part number	BAE LX-VS-SI018	BAE LX-VS-SI030
Supply voltage U_B	24 V DC	24 V DC
Operating current	85 mA	115 mA
Light field size	Ø 18 mm	Ø 30 mm
Emitter, light type	LED, infrared	LED, infrared
Wavelength	850 nm	850 nm
Dimension	M18×75 mm	M30×64 mm
Connection	M12 connector, 4-pin	M12 connector, 4-pin
Housing material	V2A	V2A
Weight	65 g	90 g
Degree of protection as per IEC 60529	IP 67	IP 67
Polarity reversal protected	yes	yes
Short-circuit protected	yes	yes
Ambient temperature range T_a	–10…+55 °C	–10…+55 °C
Storage temperature range	–25…+75 °C	–25…+75 °C

New

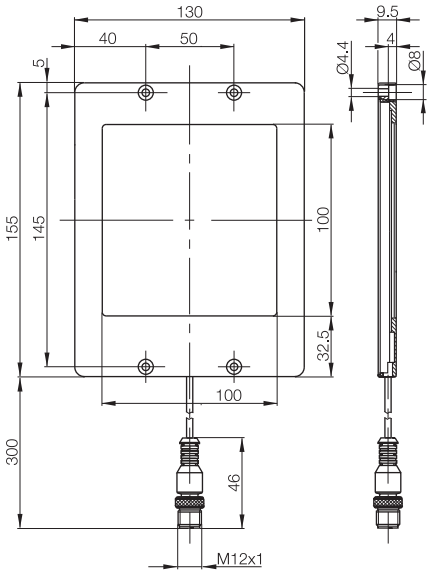
Spotlight: A spotlight is perfect for the precision illumination of specific areas. Greater inspection distances can be implemented if a spotlight is used. Unlike ring lights, spotlights can be attached in any position. You can swivel the light towards the area that you wish to illuminate.



Special properties:

- Powerful LEDs
- IP 69K
- 24 V DC supply voltage, trigger
- Extremely flat design, low space requirements
- Easy assembly

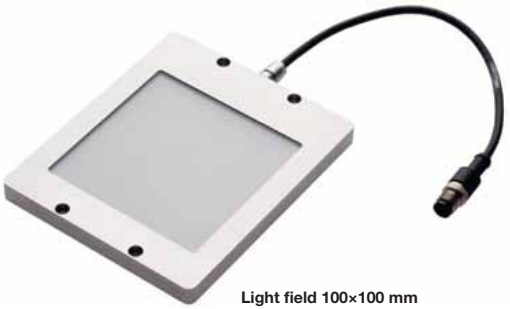
The new surface illuminator in the high form of protection IP 69K is designed for difficult environments. Absolute water and dust density withstands even the highest loads of rough day-to-day work. In this way, the background lighting not only is particularly corrosion-resistant and has a long lifetime, it can also be used in hygienic areas with their special requirements, because it is suited for high pressure cleaners.
Its powerful LEDs are of high quality and provide for an intense and uniform field of illumination. The new lights also extend the already available vision sensor accessories for difficult environments perfectly. These are, for example, a sensor housing in IP 67+ degree of protection and a 24 V DC power pack in IP 67.
Background lighting is suited for transmitted light methods or a diffuse lighting of objects. If you position them behind the object to be detected, the contours of the object are displayed in sharp focus. Partial measurements or sizes can be well checked in this manner.



Extremely Flat Background Lighting in IP 69K

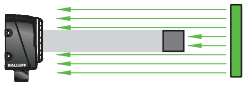
The correct light even in harsh environments

New



Light field 100×100 mm

Series	BAE LX-VS
Style	Background lighting, red light
Ordering code	**BAE00JF**
Part number	BAE LX-VS-HR100-E
Supply voltage U_B	18 to 30 V DC
Operating current	400 mA
Light field size	100×100 mm
Emitter, light type	LED, red light
Wavelength	617 nm
Dimension	155×130×9.5 mm
Fasteners	M4 screws
Connection	M12 connector, 4-pin
Housing material	V2A
Optical surface	Glass
Degree of protection as per IEC 60529	IP 69K
Polarity reversal protected	yes
Short-circuit protected	yes
Ambient temperature range T_a	–10...+55°C
Storage temperature range	–25...+75 °C



Background lighting: With the through beam method, the background lighting is positioned behind the object you wish to detect. The Vision Sensor only detects the outline of the object based on this position. Part dimensions or shapes can in this manner be checked very well. Extraneous light also poses no problems. Changes in the surface (markings, color, etc.) can be suppressed almost completely and have no influence on the test result.
Our background lights are particularly bright and versatile. They are also very suitable as diffuse incident lights to illuminate highly reflective components, for example. Due to the extremely flat design, they are ideal for use in applications with limited space.

Modern production technologies with smaller batch sizes and ever shorter production cycle times require unambiguous recognition and matching of the produced parts. In response, various systems for industrial identification such as bar codes have been developed. These are inexpensive, but wear quickly. In addition, they are inherently read-only and hold a limited amount of data.

Far greater flexibility is provided by industrial RFID, inductive identification systems with read and write capability for ensuring the most current data in every single process segment. Balluff Industrial RFID BIS reliably process large quantities of data without making visual contact.

Unlimited read/write cycles ensure flexible, rapid, contact-free communication even for the transfer of large data quantities in highly dynamic applications. Our wear-free BIS are easy to integrate in all types of controllers.

Economical Balluff identification systems are able to manage the large volumes of information required in modern-day production plants and make sure your data is transferred to the right place at the right time. All the relevant production and quality data can be acquired and recalled at any time: for optimized production processes and maximum production reliability. Profit from the advantages of Balluff Industrial RFID and benefit from more than 25 years of Balluff RFID expertise. Simply select from the product range according to your application requirements.

Benefits

- **Quick, flexible non-contact data communication without visual contact**
- **Industrial strength in any environment**
- **High-performance, cost-effective**

Why RFID from Balluff?

Comprehensive system expertise – many years of experience

More than 25 years of experience with Industrial RFID –
make use of our knowledge and expertise.

Extensive product portfolio: LF-HF-UHF
the right solution for every application.

No experiments –
benefit from our application experience.

Project support from A...Z –
your solution from a single source.

Service whenever you need it –
you can rely on us.

Global presence – short channels –
ensure rapid availability on a global scale.

Functional and operational reliability –
certified products safeguard your investment.

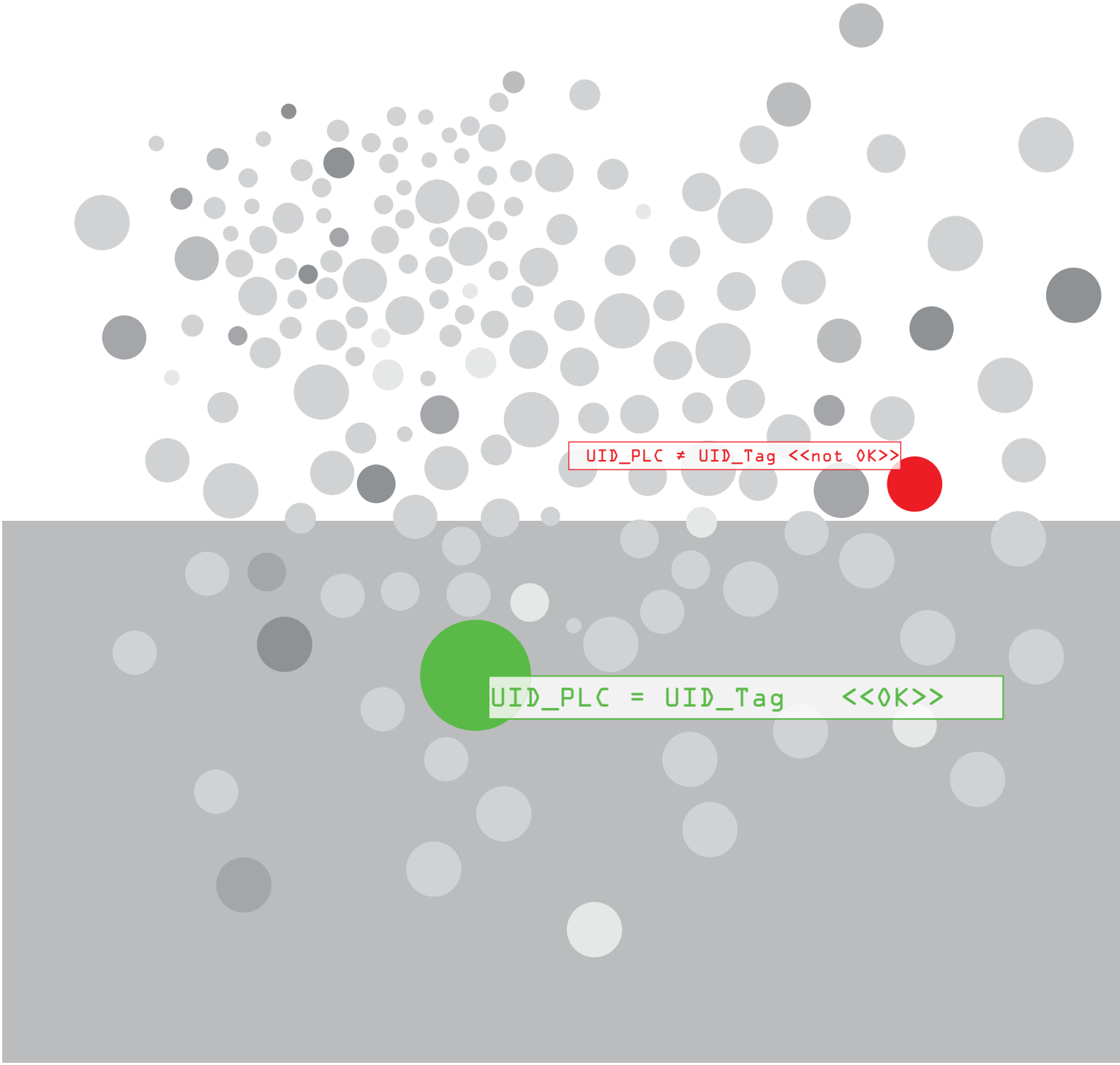
High degree of acceptance on the market –
trust the market leader in tool identification.

Flexible: solution competence –
your ideas are our motivation.

We are complete providers –
Industrial RFID is just one of our many product ranges.

More than just components –
trained integrators create solutions for you.

See the Industrial Identification brochure for a large selection of products.
For additional information, visit **www.balluff.com**


UID_PLC ≠ UID_Tag <<not OK>>
UID_PLC = UID_Tag <<OK>>

Protecting Products and Know-how
Balluff is there

Product piracy is a significant threat to the innovation force and competitiveness of the capital goods industry. According to a VDMA survey from 2008, product piracy already affects two-thirds of the more than 3000 member companies. Today, aggregates, modules and even complete machines are being copied. This is reason enough for Balluff to actively participate in the "Product and know-how protection" working group of the VDMA.

For companies, the product piracy leads to a violation of patent and brand rights and to the loss of their good image. This is frequently accompanied by an enormous price pressure on the original. At the end of the day, it not only costs companies a lot of money, but it also threatens jobs.

Only a holistic approach that includes the areas technology, product, information, process and rights, can lead to a solution. Especially with respect to technologies and products, industrial RFID components from Balluff can be an important tool in identifying the original and tracking its further path.

■ **technicalsupport@balluff.com**

- Recognizing piracy
- Securing quality
- Protecting your know-how

Applications
The use of RFID allows storing data directly at the object. This allows not only the identification of pirated copies, but also automating setup routines and increasing machine availability. By identifying security and quality-relevant parts, RFID supports you in securing your quality and ensuring security within the process. We will gladly show you the options that are relevant to you – contact us!

reddot design award
winner 2012

BIS V Industrial RFID System

The new generation for more efficiency

The variable system for intelligence in a small space: connect up to four read/write heads to one evaluation unit
Make quick, contactless data communication noticeably more efficient with Industrial RFID BIS V from Balluff. Only BIS V from Balluff combines RFID and sensors. BIS V, along with the four antenna channels, has an integrated IO-Link master with the latest version, 1.1. The four antenna channels work completely independently of each other. This saves costs, as fewer evaluation units are needed. Through the IO-Link master you have a node for additional information available, so that you can connect further sensors and/or actuators directly and can create a simple network structure.

The high performance BIS V offers maximum convenience. Display and status LEDs support ease of use. And through its USB service interface, standard hardware, like a PC, is easy to connect.
All connections are easily accessible and completely pluggable.

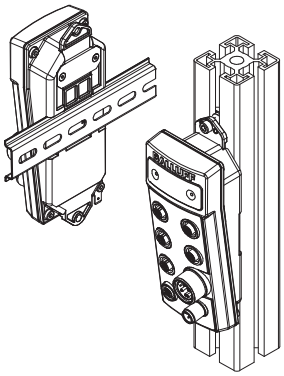
- Function indicator: each read/write head connection has two LEDs for the status and operating state
- Eight monochrome LEDs show the bus status
- LCD indicators with control buttons: setting and displaying the Profibus address and displaying read data carrier UIDs
- USB connection: for fast commissioning without bus connection (reading and writing data carriers), update/ upgrade of the evaluation unit or the read/write heads and calling up the operating menu as a PDF file
- Intelligent power plug for saving parameters on site
- Simple mounting on top-hat rails or extruded profiles

Typical applications for the combination of RFID evaluation units and sensors include identification tasks for material flow control in production systems, for conveyor systems in mechanical engineering, in assembly lines and electric suspension systems or in the entire field of intralogistics.

BIS V Industrial RFID System

The new generation for more efficiency

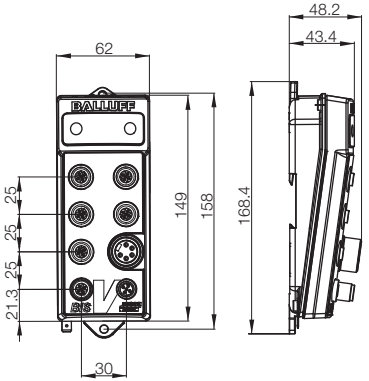
Description		BIS V RFID evaluation unit
Profibus	**Ordering code**	**BIS00T3**
	Part number	BIS V-6102-019-C001
EtherCAT	**Ordering code**	**in preparation**
	Part number	BIS V-6110-063-C002
Power supply		24 V DC ±10 % LPS Class 2
Residual ripple		≤ 10 %
Power supply		≤ 2 A
Ambient temperature T_a		0...+60 °C
Degree of protection as per IEC 60529		IP 65
Housing material		Cast zinc
Weight		800 g
Connection H1 - H4		M12 socket, 5-pin, A-coded
Power connection		7/8" plug, 5-pin
Application interface		IO-Link 1.1, USB 2.0
Application with read/write heads		BIS VM-3… and BIS VL-3…



CC link and **EtherNet/IP** will be available as additional interfaces in the second half of 2013.

The compact EMC-protected metal housing with small dimensions (170×60×40 mm) is perfectly integrated and simple to mount. In control cabinets or in the field up to IP 65, on a top-hat rail, or on a profile.

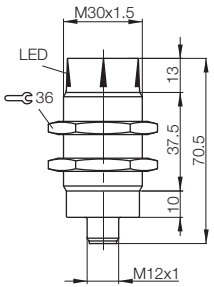
The BIS V industrial RFID system was developed and qualified according to the principles of GAMP® 5.
You can obtain more detailed information upon request at **rfidpharma@balluff.com**

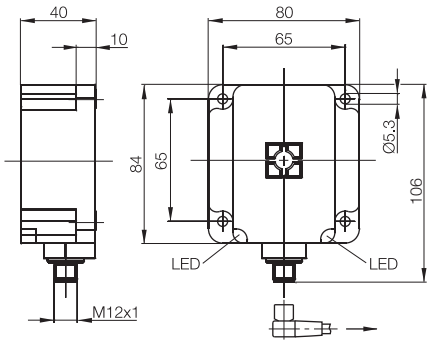


Description	HF read/write head BIS VM	HF read/write head BIS VM	HF read/write head BIS VM
Dimensions	**M30×1.5**	**80×80×40 mm**	**80×80×40 mm**
Mounting in steel	non-flush	non-flush	non-flush
Antenna type	round	round	Rod
Ordering code	**BIS00RF**	**BIS00T0**	**BIS00T2**
Part number	BIS VM-300-001-S4	BIS VM-301-001-S4	BIS VM-351-001-S4
Power supply	≤ 150 mA	≤ 150 mA	≤ 150 mA
Power supply	18…30 V DC	18…30 V DC	18…30 V DC
Residual ripple	≤ 1,3 V_{ss}	≤ 1,3 V_{ss}	≤ 1,3 V_{ss}
Ambient temperature range T_a	–25...+55 °C	–25...+55 °C	–25...+55 °C
Degree of protection as per IEC 60529	IP 67 (with connector)	IP 67 (with connector)	IP 67 (with connector)
Function indicator	yes	yes	yes
Housing material	Nickel-plated CuZn	PBT	PBT
Weight	100 g	190 g	360 g
Connection	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin

Please take the corresponding write/read distance from the Industrial Identification catalog, Chapter BIS M (BIS VM-300... corresponds to BIS M-300...).

Securing clamp included in the scope of delivery.





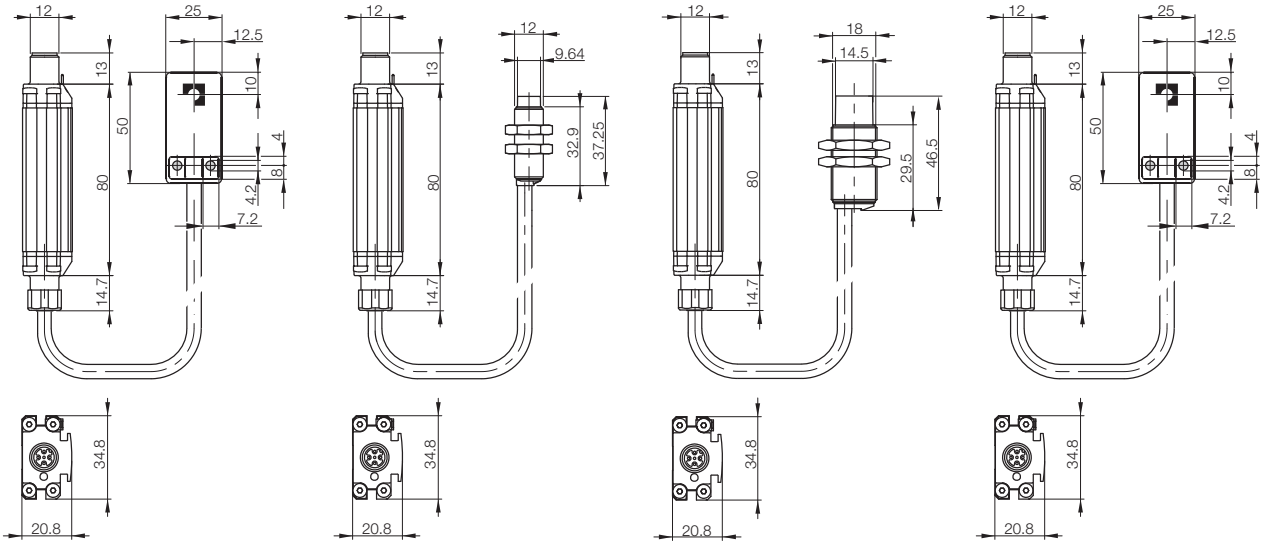
Please order matching plug connectors separately.
(Unshielded cable can be used only for lengths up to 3 m. Cable lengths over 3 m have to be shielded.)

Plug side	Socket side	Cable material	Color	BCC039H	BCC039R	BCC03A8	BCC03AJ	BCC039J	BCC039T	BCC03A9	BCC03AK	BCC039K	BCC039U	BCC03AA	BCC03AL	BCC039L	BCC039W	BCC03AC	BCC03AM	BCC039M	BCC039Y	BCC03AE	BCC03AN
				0.3 m				0.6 m				1 m				1.5 m				2 m			
straight	straight	PUR	black	■				■				■				■				■			
straight	angled	PUR	black		■				■				■				■				■		
angled	straight	PUR	black			■				■				■				■				■	
angled	angled	PUR	black				■				■				■				■				■

Industrial RFID System BIS V

The new generation for more efficiency

HF read/write head BIS VM	HF read/write head BIS VM	HF read/write head BIS VM	HF read/write head BIS VM
25x50x10 mm	**M12×1**	**M18×1**	**25×50×10 mm**
non-flush	non-flush	non-flush	non-flush
round	round	round	Rod
BIS00T9	**BIS00T7**	**BIS00T8**	**BIS00T6**
BIS VM-305-001-S4	BIS VM-306-001-S4	BIS VM-307-001-S4	BIS VM-352-001-S4
≤ 150 mA	≤ 150 mA	≤ 150 mA	≤ 150 mA
18…30 V DC	18…30 V DC	18…30 V DC	18…30 V DC
≤ 1,3 V_{ss}	≤ 1,3 V_{ss}	≤ 1,3 V_{ss}	≤ 1,3 V_{ss}
–25...+55 °C	–25...+55 °C	–25...+55 °C	–25...+55 °C
IP 67 (with connector)	IP 67 (with connector)	IP 67 (with connector)	IP 67 (with connector)
yes	yes	yes	yes
AlMgSi 0.5/ABS-GF16	AlMgSi 0.5/nickel-plated CuZn	AlMgSi 0.5/nickel-plated CuZn	AlMgSi 0.5/ABS-GF16
200 g	190 g	220 g	370 g
M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin	M12 connector, 4-pin



- Distances up to 275 mm offer greater flexibility, regardless of the background surface
- FRAM data carriers ensure virtually unlimited read/write cycles
- Can be used all over the world thanks to ISO-15693-conformity
- Status indicators mounted directly on the antenna housing are a valuable feature
- The robust housing guarantees reliable operation in harsh environments
- 100 % RFID quality means greater reliability

Application areas
The advantages of the HF antenna BIS M-350 become immediately obvious in all applications where the data carrier is mounted directly on metal or the material in the immediate vicinity cannot be predetermined accurately, for example when products are transported in a crate. BIS M sensors simply ignore the different materials, which means that water, oil, dust and metal have absolutely no effect on the high-performance data carriers.

A Powerful High-frequency Package Ensures Maximum Transparency

HF antenna BIS M-340 and BIS M-350

One of the challenges of intralogistics is the transportation of constantly changing materials. However, smooth operation and transparent processes are still required in spite of the wide variety of different products. A requirement that is not always easy for RFID systems because metallic surfaces, fluids and dirt really put these systems to the test. Not the HF antenna BIS M-350, however. The antenna is fitted with optimized data carriers that help overcome difficulties of this kind with ease while reliably ensuring maximum transparency. All data can be traced at any time.

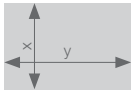
The following system versions are available:

– BIS M 350 and 450 (rod antenna)
– BIS M 340 and 440 (circular antenna)

CE

Connection to processor	**Ordering code**	**BIS00LZ**		**BIS00N6**	
	Part number	BIS M-350-001-S115		BIS M-340-001-S115	
Connection to controller (TCP/IP)	**Ordering code**	**BIS00R0**		**BIS00PZ**	
	Part number	BIS M-450-039-001-06-ST2		BIS M-440-039-001-06-ST2	
Dimensions		240×120×60 mm		240×120×60 mm	
Installation type (steel)		with clear zone		with clear zone	
Antenna type		**Rod**		**Circular**	
Degree of protection per IEC 60529		IP 65		IP 65	
Ambient temperature T_a		0...+55 °C		0...+55 °C	
Housing material		PC		PC	
Appropriate data carrier		**BIS M-153-02/A**		**BIS M-107-03/L-H200**	
Clear zone for data carrier		> 240×480 mm		> 240×480×120 mm	
Read/write distance		0...275 mm		0...100 mm	
Offset at distance	Dimensions	x	y	x	y
	0 mm	±200 mm	±100 mm	±50 mm	±100 mm
	25 mm	±200 mm	±100 mm	±50 mm	±100 mm
	50 mm	±200 mm	±100 mm	±50 mm	±95 mm
	75 mm	±200 mm	±100 mm	±45 mm	±85 mm
	100 mm	±200 mm	±100 mm	±40 mm	±75 mm
	150 mm	±200 mm	±100 mm		
	200 mm	±175 mm	±100 mm		
	250 mm	±100 mm	±100 mm		

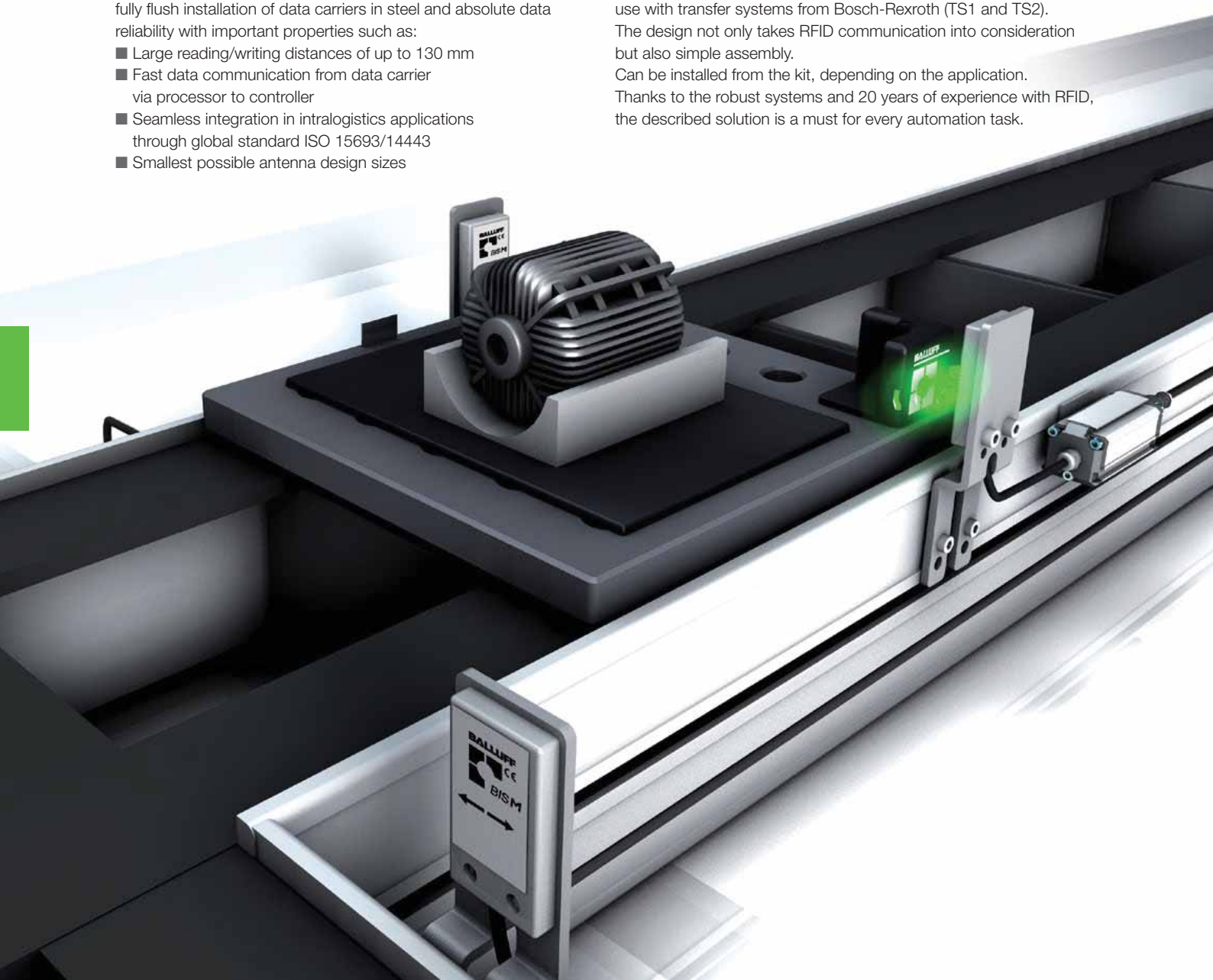
Appropriate data carrier
BIS M-153 and BIS M-107



The Balluff BIS-M System combines advantages such as the fully flush installation of data carriers in steel and absolute data reliability with important properties such as:

- Large reading/writing distances of up to 130 mm
- Fast data communication from data carrier via processor to controller
- Seamless integration in intralogistics applications through global standard ISO 15693/14443
- Smallest possible antenna design sizes

The components are specially designed and manufactured for use with transfer systems from Bosch-Rexroth (TS1 and TS2). The design not only takes RFID communication into consideration but also simple assembly.
Can be installed from the kit, depending on the application.
Thanks to the robust systems and 20 years of experience with RFID, the described solution is a must for every automation task.



Industrial RFID in Transfer Systems

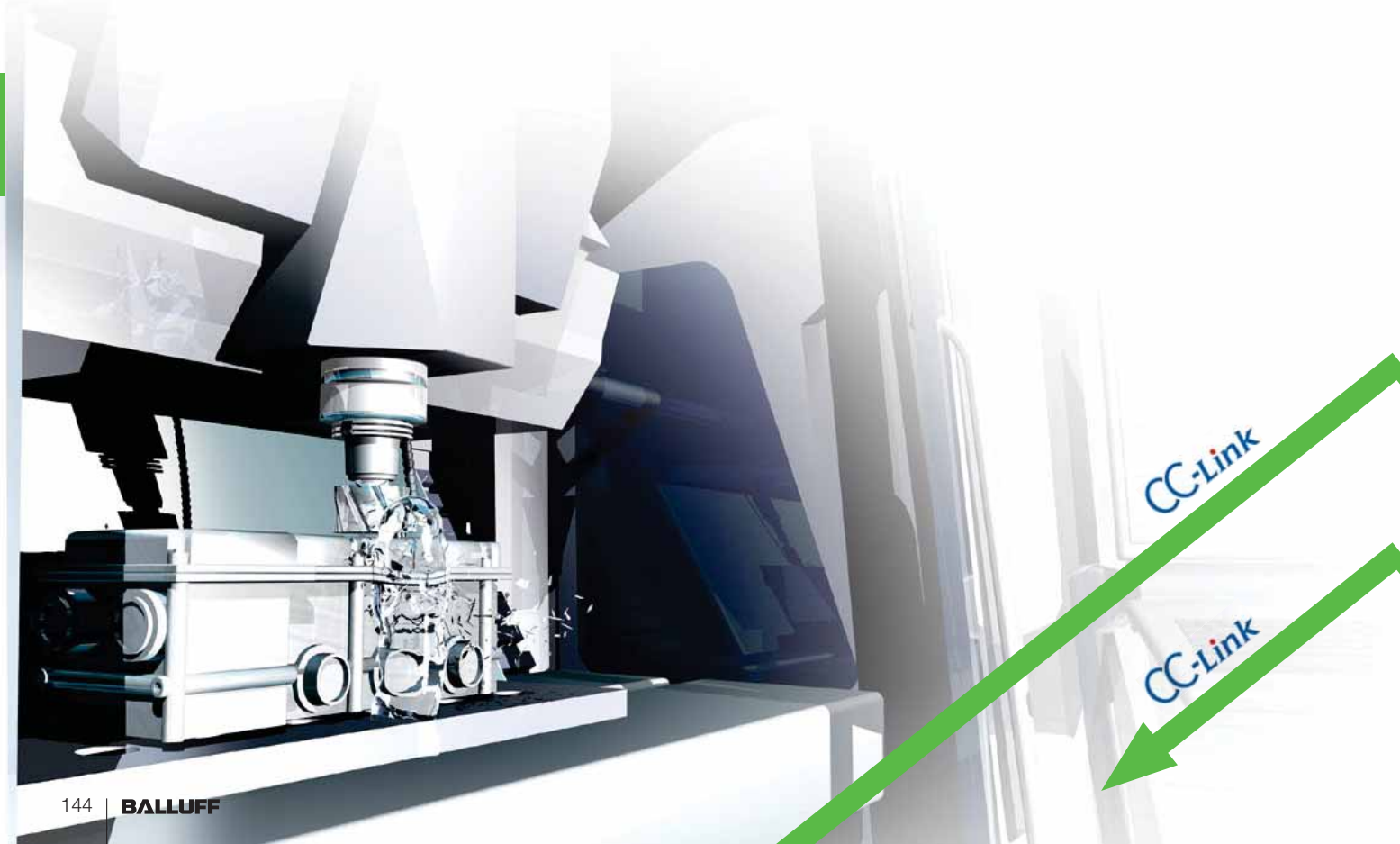
High data reliability and extremely simple assembly

Ordering code	BIS00NZ	BIS00P1	BIS00M2	BIS004A	
Part number	BIS M-191-02/A	BIS M-154-03/A	BIS M-152-03/A	BIS M-122-02/A	
Dimensions	24×24×21 mm	Ø 8×35 mm	Ø 4×22 mm	Ø 10×4.5 mm	
Antenna type	Rod	Rod	Rod	Circular	
Capacity	2000 bytes	112 bytes	112 bytes	2000 bytes	
Working/storage temperature	–30...+70 °C/–30...+85 °C	–25...+50 °C/–30...+60 °C	–25...+50 °C/–30...+60 °C	0...+70 °C/–25...+85 °C	
Degree of protection	IP 67	IP 67	IP 67	IP 67	
Installation	non-metal	non-metal	non-metal	non-metal	in metal
Read/write distance					
BIS M-305				0...7 mm	0...5 mm
BIS M-307				0...7 mm	0...5 mm
BIS M-352	0...14 mm	0...10 mm	0...10 mm		

Ordering code	BIS00NY	BIS00NK	BIS00P2
Part number	BIS M-352-001-S115	BIS M-305-001-S115	BIS M-307-001-S115
Read/write head			
Dimensions	25×50×10 mm	25×50×10 mm	M18×1
Antenna type	Rod	Circular	Circular
Working/storage temperature	0...+70 °C/–20...+85 °C	0...+70 °C/–20...+85 °C	0...+70 °C/–20...+85 °C
Degree of protection	IP 67	IP 67	IP 67
Cable	0.5 m PUR	0.5 m PUR	0.5 m PUR
Connection to	Remote electronics	Remote electronics	Remote electronics
Remote electronics			
Voltage	24 V DC +10 %/–20 % including ripple		
Current	< 50 mA no load		
Working/storage temperature	0...+70 °C/–20...+85 °C		
Degree of protection	IP 67		
Connection to/interface	Processor/M12 connector, 8-pin		

- Flexible use due to a wide range of different combinations of data carriers and antennas
- Up to two antennas per processor
- Tested quality with CC-Link certificate
- Make use of timesaving features: Connector-based cabling, robust housing that is easy to install, preassembled function modules and diagnostics function that enable easy commissioning

The CC Link field bus protocol ensures quick, robust communication between different stations. The new BIS M-699 processor can now be used directly in the field. Conformity with standards ISO 15693 and 14443 as well as globally approved frequency of 13.56 MHz allow worldwide use of this CC-Link processor.

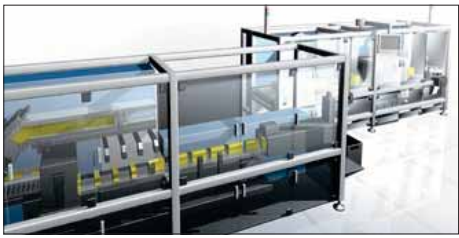


Processor with CC-Link for 13.56 MHz

Suitable for every environment

Model	BIS M-699
Description	Processor
Ordering code	**BIS00LY**
Part number	BIS M-699-052-050-03-ST11
Dimensions	200×100×60 mm
Antenna ports	2
Standards	ISO 15693/14443
Interface	CC-Link
Degree of protection per IEC 60529	IP 65
Housing material	Metal

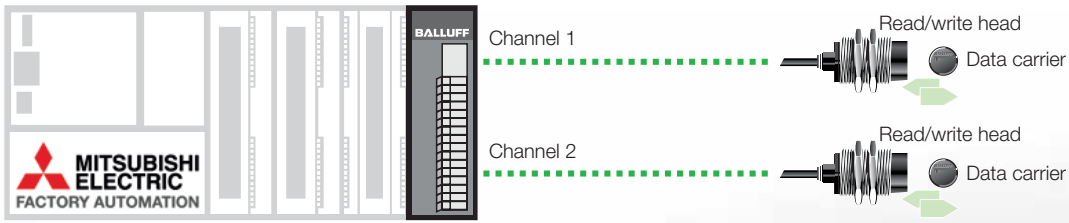
The HF processor BIS M-699 with 13.56 MHz is used directly in the field in all applications where robust controllers are connected directly to CC-Link. Thanks to the wide variety of special data carriers, for example, optimized for flush installation in metal, for temperatures up to 200 °C or for the maximum distance, this HF processor can be used in almost all industrial sectors.



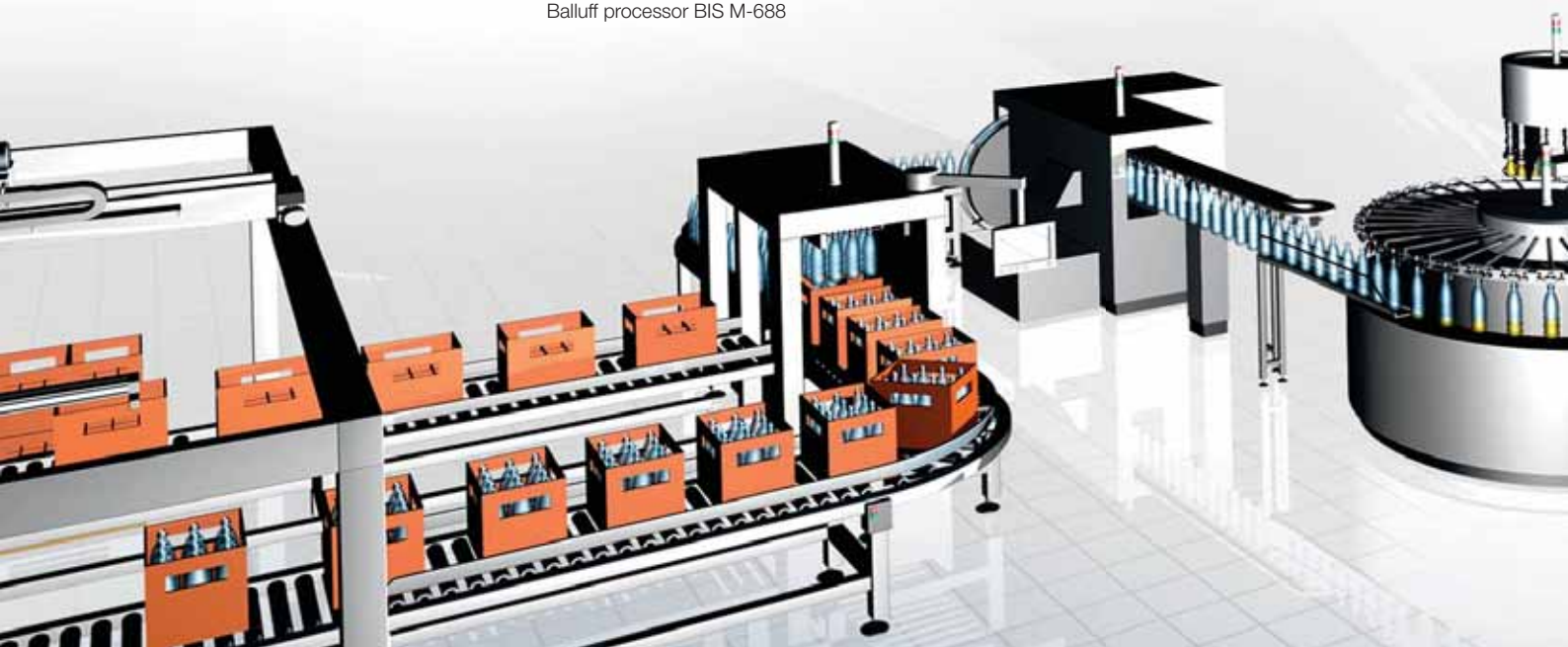
- Easy startup with function modules at no extra cost
- Direct integration into the controller eliminates the need for decentralized wiring
- Function indicator directly on the terminals
- Degree of protection IP 40

The HF processor BIS M-688-001 with 13.56 MHz was developed specially for integration in the MELSEC-Q series from Mitsubishi. All read/write heads from the BIS M series can be connected to the 2-channel card. A wide range of variations provides the right configuration for every application.

Mitsubishi MELSEC-Q series



Balluff processor BIS M-688



Processor for Mitsubishi Controller

Identification without diversions

The MELSEC-Q series enables the user to select the best combination of CPU modules as well as communication, special or I/O modules for configuration of tailored systems. The use of RFID ensures the best possible individual solutions. And in all areas where the highest possible level of flexibility is required. RFID makes processes even more transparent and effective.

Model	BIS M-688
Description	Processor
Ordering code	**BIS00HM**
Part number	BIS M-688-001
Dimensions	98×90.5×27 mm
Frequency	13.56 MHz
Antenna ports	2
Standards	ISO 15693/14443
Interface	Integrated directly in Mitsubishi system Q
Degree of protection per IEC 60529	IP 40

- High degree of protection – where it is needed
- Data carrier in screw form – simplest form of installation
- Large distances – for more flexibility in your application
- ISO 15693 – applicable worldwide

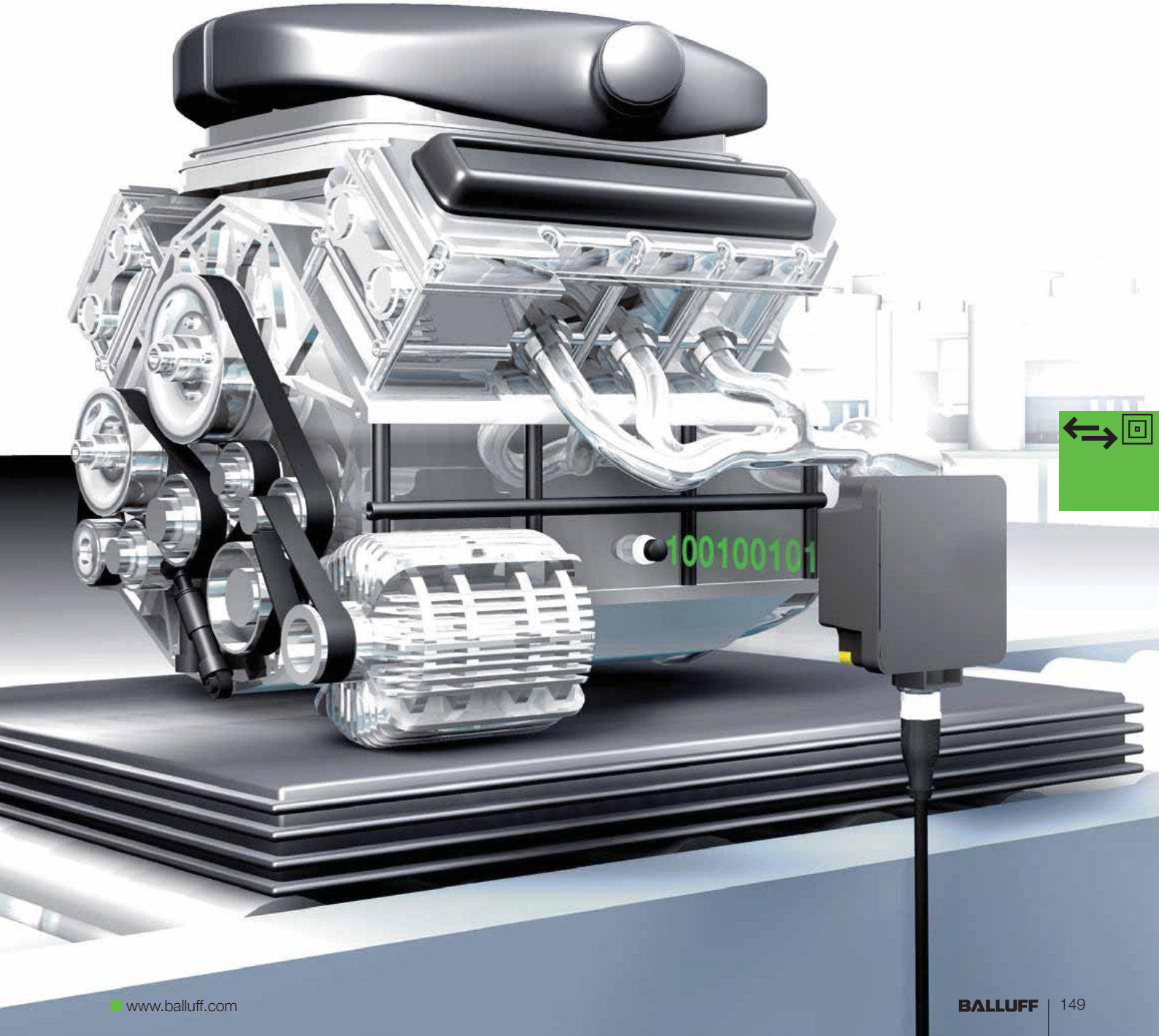
It is not always possible to use a workpiece carrier in the production process. If the information still has to be coupled directly to the object, it is essential to install the data carrier at the object without any difficulties and to quickly remove it again after it has fulfilled its task. A screw is ideally suited for this purpose.
The new data carrier in accordance with ISO 15693 with a storage capacity of 2000 bytes is perfectly suited, for example, for parts tracking in manufacturing processes and for closed-loop applications in which it is always being used recurrently. Varied application options also open up for the identification of manufacturing equipment, such as pressing tools. Thanks to the large reading distances, the data screw in IP 68/x9K provides high installation flexibility.

CE

Ordering code	BIS00M8	BIS00M9
Part number	BIS M-140-02/A-M8	BIS M-140-02/A-M6
Mounting	M8 thread	M6 thread
Memory capacity read/write	2000 bytes	2000 bytes
Degree of protection per DIN EN 40050	IP 68/x9K	IP 68/x9K
Storage temperature range	–25...+95 °C	–25...+95 °C

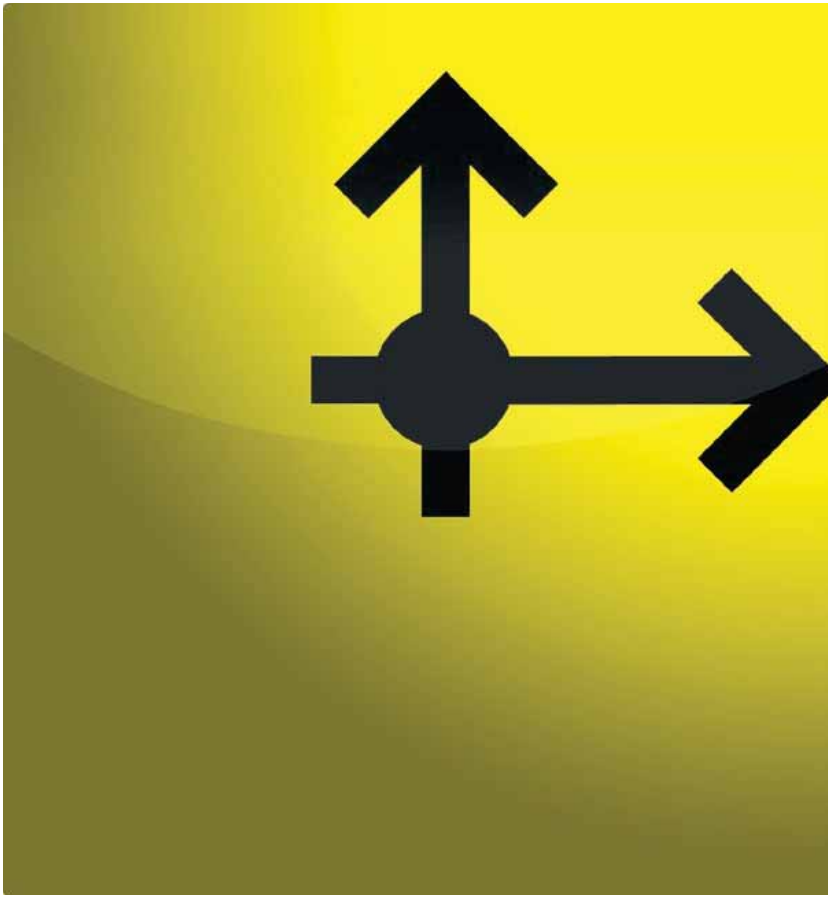
HF Databolt™ BIS M

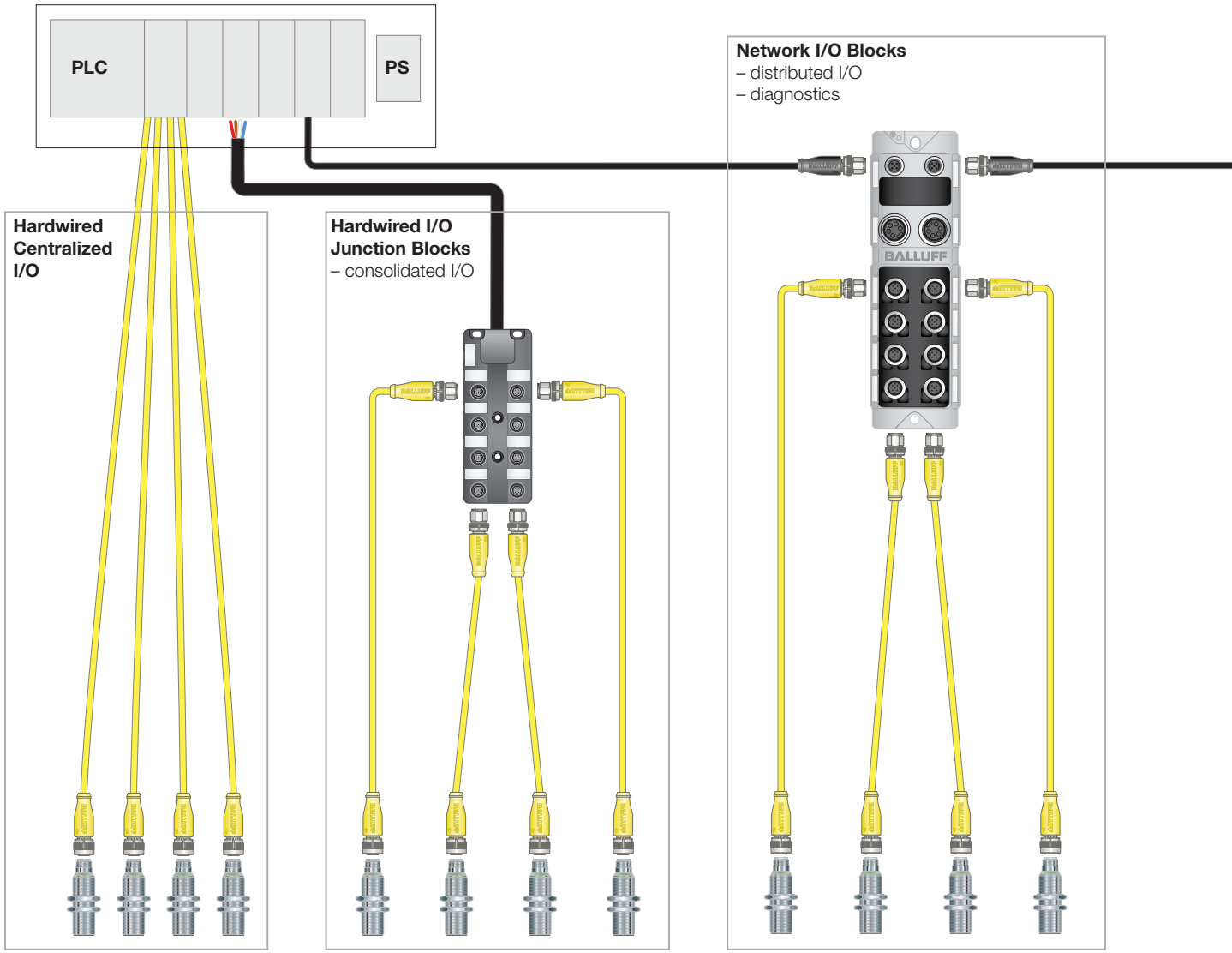
Better safe than sorry – "screwed connection" data



Industrial Networking and Connectivity

Ethernet/IP
Profinet
Industrial Ethernet
CC-Link
Distributed Modular I/O
Inductive Couplers
Intelligent Sensors
Connectors
Power Supplies

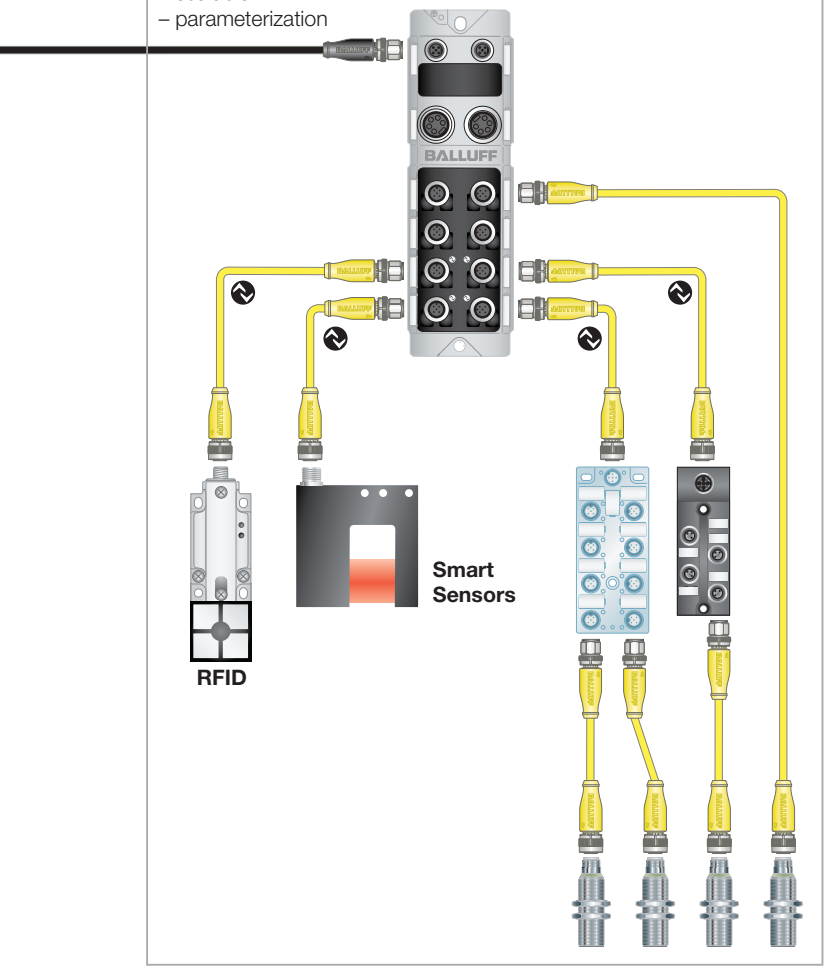



PLC
PS
Network I/O Blocks
– distributed I/O
– diagnostics
Hardwired
Centralized
I/O
Hardwired I/O
Junction Blocks
– consolidated I/O
BALLUFF

Industrial Networking and Connectivity

System technology networked with intelligence

Network Blocks with IO-Link
– distributed I/O
– diagnostics
– scalable
– parameterization



Hardwired Centralized I/O

Advantages
- Low component cost
- Basic electrical knowledge needed
- Low MRO costs

Disadvantages
- No diagnostics
- Hard to troubleshoot
- High maintenance cost
- Large number of cables routed to controls cabinet
- Long sensor cables
- Long downtime

Hardwired I/O with Junction Blocks

Advantages
- Low component cost
- Basic electrical knowledge needed
- Low MRO costs
- Fewer multi-conductor cables back to controls cabinet
- Shorter sensor cables

Disadvantages
- No diagnostics
- Hard to troubleshoot
- High maintenance cost
- Long downtime

Network I/O Blocks

Advantages
- Diagnostics
- Faster troubleshooting
- One cable back to the controls cabinet
- Lower maintenance cost
- Shorter sensor cables
- Higher up time

Disadvantages
- Higher component costs
- Network knowledge needed

IO-Link Modular Network I/O

Advantages
- Diagnostics
- Faster troubleshooting
- One cable back to the controls cabinet
- Lower maintenance cost
- Shorter sensor cables
- Higher up time
- Scalable
- Parameterization

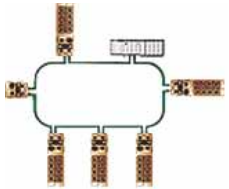
Disadvantages
- Higher component costs
- Network knowledge needed

Ethernet/IP with IO-Link functionality
IO-Link not only ensures freedom of installation, but also guarantees simplified wiring, integrated diagnostics and central configuration. System failures can be reliably prevented and systems started up again quickly if the worst comes to the worst.

Ethernet/IP with IO-Link guarantees efficient operation, saves time, reduces costs and incorporates intelligent connection technology to improve process quality.

The Ethernet/IP module with IO-Link includes four IO-Link master ports that can be configured and used fully independently of one another. You get four additional, freely configurable standard I/O ports that provide a further eight inputs/outputs for standard sensors and actuators.

DeviceLevel Ring (DLR) compatible
One fault tolerant ring topology



Webserver configuration and diagnostics
View LED status and configure parameters from anywhere

Fieldbus	Ethernet/IP	
Type	8× IO-Link, 8 DI/DO	
Ordering code	**BNI006A**	
Part number	BNI EIP-508-105-Z015	
Operating voltage U_B	18...30 V DC	
Module current consumption	BUS/RUN	
AUX input/output power status UA LED	Display/pushbutton	
Module status indicator: Mod LED	Yes	
Network status indicator: Net LED	Yes	
Port status indicator	Black, red, yellow	
Connection: Fieldbus	M12, D-coded, female	
Connection AUX power	7/8", plug, 4-pin	
Connection: I/O ports	M12, A-coded, female	
No. of I/O ports	8	
Number of inputs	max. 16 PNP	
Number of outputs	max. 16 PNP	
Configurable inputs/outputs	Yes	
Max. load current sensors/channel	200 mA	
Max. output load current	1.2 A/2 A	
Port status indicator (signal status)	Yellow LED	
Port diagnostic indicator (overload)	Red LED	
Total current $U_{Actuator}$	≤ 9 A	
Total current U_{Sensor}	≤ 9 A	
Degree of protection per IEC 60529	IP 67 (when connected)	
Operating temperature T_a	–5...+70 °C	
Storage temperature range	–25...+70 °C	
Mounting	2 mounting holes	
Dimensions (L×W×H)	225×68×36.9 mm	
Housing material	Nickel-plated GD-Zn	

IO-Link

No. of IO-Link master ports	8x master	
Operating modes (3-wire)	SIO, COM 1, COM 2,	
Indicators Communication	Green LED	
Error	Red LED	
Max. load current for IO-Link device	1.2 A	

EtherNet/IP
Network I/O Block with embedded switch

IO-Link

	Ethernet/IP	Ethernet/IP	Ethernet/IP	Ethernet/IP
	4× IO-Link, 12 DI/DO PNP	16 DI PNP	16 DI/DO PNP	8 DO PNP
	BNI004A	**BNI004M**	**BNI004F**	**BNI005J**
	BNI EIP-502-105-Z015	BNI EIP-104-105-Z015	BNI EIP-302-105-Z015	BNI EIP-202-105-Z015
	18...30 V DC	18...30 V DC	18...30 V DC	18...30 V DC
	120 mA...130 mA	120 mA...130 mA	120 mA...130 mA	BUS/RUN
	US /no	US /no	US /no	Display/pushbutton
	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes
	Black, red, yellow	Black, red, yellow	Black, red, yellow	Black, red, yellow
	M12, D-coded, female	M12, D-coded, female	M12, D-coded, female	M12, D-coded, female
	7/8", male, 4-pin	7/8", male, 4-pin	7/8", male, 4-pin	7/8", plug, 4-pin
	M12, A-coded, female	M12, A-coded, female	M12, A-coded, female	M12, A-coded, female
	8	8	8	8
	max. 12 PNP	16 PNP	max. 16 PNP	
	max. 12 PNP		max. 16 PNP	8
	Yes	No	Yes	No
	200 mA	200 mA	200 mA	
	1.6 A/2 A	2 A	2 A	2 A
	Yellow LED	Yellow LED	Yellow LED	Yellow LED
	Red LED	Red LED	Red LED	Red LED
	≤ 9 A	≤ 9 A	≤ 9 A	≤ 9 A
	≤ 9 A	≤ 9 A	≤ 9 A	
	IP 67 (when connected)	IP 67 (when connected)	IP 67 (when connected)	IP 67 (when connected)
	–5...+70 °C	–5...+70 °C	–5...+70 °C	–5...+70 °C
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	2 mounting holes	2 mounting holes	2 mounting holes	2 mounting holes
	225×68×36.9 mm	225×68×36.9 mm	225×68×36.9 mm	175×68×36.9 mm
	Nickel-plated Gd-Zn	Nickel-plated Gd-Zn	Nickel-plated Gd-Zn	Nickel-plated GD-Zn

	4× master
	SIO, COM 1, COM 2, COM 3
	Green LED
	Red LED
	1.6 A

Profinet with display, integrated switch and web server

Ethernet is increasingly becoming the communications medium of the future for mechanical and plant engineering. In some areas, it has already incrementally replaced the Fieldbus. Profinet has for a long time been a globally recognized standard for network technology. Based on Ethernet, communication over Profinet is significantly faster, and the volume of data is significantly higher than with classic fieldbus systems and allows the connection of time-critical drive technology. Furthermore, Profinet is quick to install and integrates easily into existing networks. In addition to time savings and considerable cost savings comes the added benefit of ease of operation. This is because only Balluff provides Profinet modules with a display that allows IP addresses to be blocked, protecting the modules from accidental changes. This increases security and simplifies maintenance.

The Profinet module with IO-Link functionality has four or eight IO-Link master ports, which the user can configure and use completely independently of one another. You get four additional, freely configurable standard-I/O ports, which make an additional eight inputs/outputs available for standard sensors and actuators.

In addition the Profinet blocks provide an integrated 2-port Ethernet switch that makes it possible to install a linear topology in the system without an additional external switch.

The integrated web server is likewise new in this generation.

Fieldbus	Profinet	
Version	8× IO-Link, 8 DI/DO	
Ordering code	**BNI005H**	
Part number	BNI PNT-508-105-Z015	
Supply voltage UB	18...30 V DC	
Function indicator	BUS/RUN	
Indicators/input	Display/pushbutton	
Module status indicator: Mod LED	Yes	
Network status indicator: Net LED	Yes	
Port status indicator	Black, red, yellow	
Connection: Fieldbus	M12, D-coded, female	
Connection: AUX power	7/8", plug, 5-pin	
Connection: I/O ports	M12, A-coded, female	
No. of I/O ports	8	
Number of inputs	max. 16 PNP	
Number of outputs	max. 16 PNP	
Configurable inputs/outputs	Yes	
Max. load current sensors/channel	200 mA	
Max. load current, output	1.2 A/2 A	
Port status indicator (signal status)	Yellow LED	
Port diagnostic indicator (overload)	Red LED	
Total current $U_{Actuator}$	≤ 9 A	
Total current U_{Sensor}	≤ 9 A	
Degree of protection as per IEC 60529	IP 67 (when connected)	
Operating temperature T_a	–5...+70 °C	
Storage temperature	–25...+70 °C	
Mounting	2 mounting holes	
Dimensions (L×W×H)	225×68×36.9 mm	
Housing material	Nickel-plated GD-Zn	

IO-Link Version 1.1

No. of IO-Link master ports		8x master	
Operating modes (3-wire)		SIO, COM 1, COM 2,	
Display	Communication	Green LED	
	Error	Red LED	
Max. load current for IO-Link device		1.2 A	

Profinet

Network I/O Block with pushbutton display

IO-Link

	Profinet	Profinet	Profinet	Profinet	Profinet
	4× IO-Link, 16× DI/DO	16× DI/DO, configurable	16 DI	8 DO	8 DI/8 DO
	BNI004U	**BNI0052**	**BNI0053**	**BNI005F**	**BNI005K**
	BNI PNT-502-105-Z015	BNI PNT-302-105-Z015	BNI PNT-104-105-Z015	BNI PNT-202-105-Z015	BNI PNT-305-105-Z015
	18...30 V DC	18...30 V DC	18...30 V DC	18...30 V DC	18...30 V DC
	BUS/RUN	BUS/RUN	BUS/RUN	BUS/RUN	BUS/RUN
	Display/pushbutton	Display/pushbutton	Display/pushbutton	Display/pushbutton	Display/pushbutton
	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes
	Black, red, yellow	Black, red, yellow	Black, red, yellow	Black, red, yellow	Black, red, yellow
	M12, D-coded, female	M12, D-coded, female	M12, D-coded, female	M12, D-coded, socket	M12, D-coded, female
	7/8", plug, 5-pin	7/8", plug, 5-pin	7/8", plug, 5-pin	7/8", plug, 5-pin	7/8", plug, 5-pin
	M12, A-coded, female	M12, A-coded, female	M12, A-coded, female	M12, A-coded, socket	M12, A-coded, female
	8	8	8	8	8
	max. 16 PNP	max. 16 PNP	16 PNP		8 PNP
	max. 16 PNP	max. 16 PNP		8 PNP	8 PNP
	Yes	Yes	No	No	No
	200 mA	200 mA	200 mA		200 mA
	1.6 A/2 A	2 A		2 A	2 A
	Yellow LED	Yellow LED	Yellow LED	Yellow LED	Yellow LED
	Red LED	Red LED	Red LED	Red LED	Red LED
	≤ 9 A	≤ 9 A		≤ 9 A	≤ 9 A
	≤ 9 A	≤ 9 A	≤ 9 A		≤ 9 A
	IP 67 (when connected)	IP 67 (when connected)	IP 67 (when connected)	IP 67 (when connected)	IP 67 (when connected)
	–5...+70 °C	–5...+70 °C	–5...+70 °C	–5...+70 °C	–5...+70 °C
	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C	–25...+70 °C
	2 mounting holes	2 mounting holes	2 mounting holes	2 mounting holes	2 mounting holes
	225×68×36.9 mm	225×68×36.9 mm	225×68×36.9 mm	175×68×36.9 mm	300×68×36.9 mm
	Nickel-plated GD-Zn	Nickel-plated GD-Zn	Nickel-plated GD-Zn	Nickel-plated GD-Zn	Nickel-plated GD-Zn

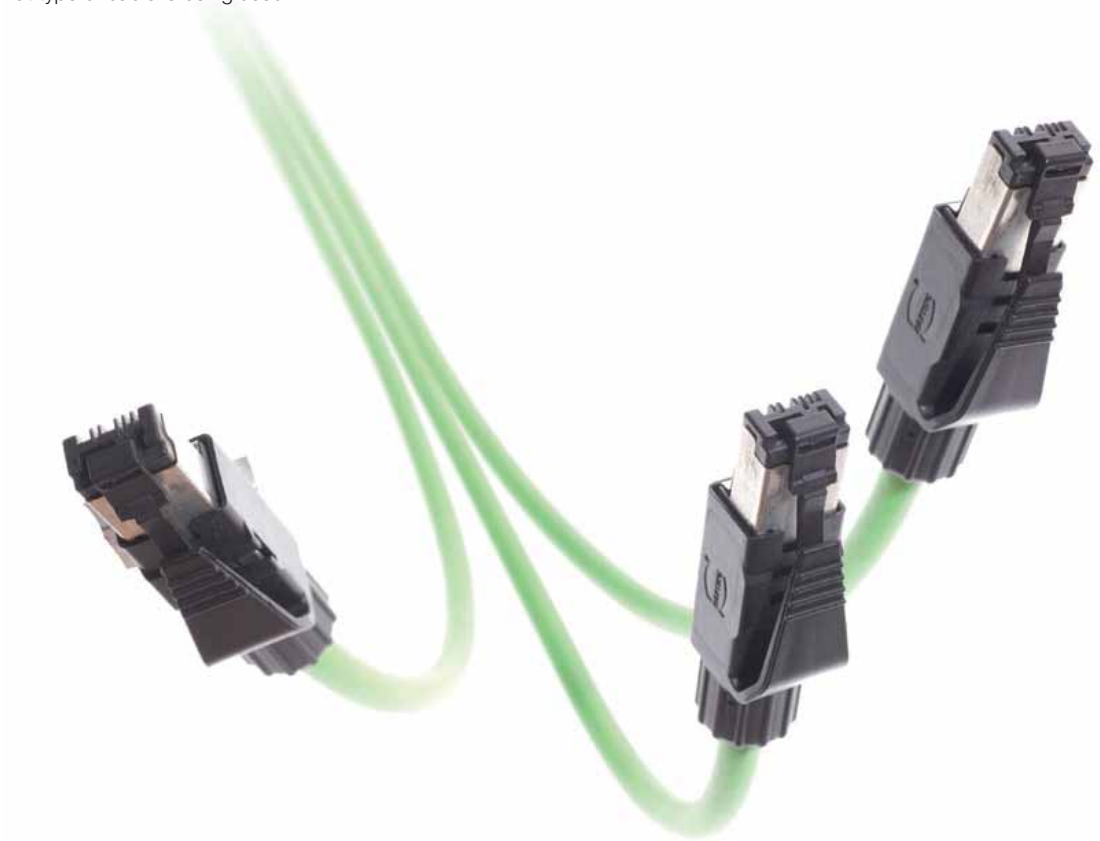
	4× master
	SIO, COM 1, COM 2, COM 3
	Green LED
	Red LED
	1.6 A

Ethernet
Unmanaged Switches

Ethernet-based network systems are gaining more and more importance in industrial automation. Balluff provides a wide variety of Ethernet-based systems and network components such as Profinet or Ethernet/IP for machine and plant equipment.

Balluff now offers a complete system so that you can easily link Ethernet system components with the Ethernet.

With the switch, it is now possible to connect Ethernet devices in a Star Topology. The RJ45 ports and the 10 and 100 Mbps transmission rates support this. The transfer speed is automatically set via the auto-negotiation function. Wiring errors are reliably ruled out by the autocrossing function. This is because the module identifies on its own what type of cable is being used.



Industrial Ethernet
Unmanaged Switches

Communication	Ethernet	Ethernet	Ethernet
Version	Ethernet unmanaged switch	Ethernet unmanaged switch	Ethernet unmanaged switch
Ordering code	**BNI005E**	**BNI0067**	**BNI000F**
Part number	BNI TCP-951-000-E028	BNI TCP-952-000-E029	BNI EIP-950-000-Z009
Ports	5×RJ45 Spring force clamp	8×RJ45 Spring force clamp	9xM12 D-coded
System power supply	0,2...2,5 mm²	0,2...2,5 mm²	7/8 4 pole
Supply voltage U_B	12...48 V DC	2×12…30 V DC redundant	18 V...30.2 V
Transfer rate	10/100 Mbps full duplex Auto crossing	10/100 Mbps full duplex Auto crossing	10/100 Mps Auto crossing
Operating modes	Auto negotiation	Auto negotiation	Auto negotiation
Communication status	Link/run LED, (yellow/green)	Link/run LED, (yellow/green)	Link/run LED, (yellow/green)
Supply voltage	LED (green), power	LED (green), power	LED (green), power
Degree of protection	IP 20	IP 20	IP 67
Housing	Black plastic	Black plastic	GD-ZN nickel plated
Temperature range	–10...+60 °C (storage temperature –25...+70 °C)	–10...+60 °C (storage temperature –25...+70 °C)	–5...+55 °C
Mounting type	Snaps onto support rail TH35 (EN60715)	Snaps onto support rail TH35 (EN60715)	2 hole screw/mounting

Cable Type	Conductor	Jacket	Ratings	M12 Straight to M12 Straight	M12 Straight to RJ45
Unshielded UTP 2 pair	Stranded	TPE	600V, CMX Flex 10mio,ODVA	BCC M414-M414-6D-366-EX64N9-_ _ _	BCC M414-E894-8G-695-EX64N9-_ _ _
Shielded STP 2pair	Stranded	PVC	Riser, CMR, ODVA	BCC M414-M414-6D-338-VS64N9-_ _ _	BCC M414-E894-8G-672-VS64N9-_ _ _
		TPE	Flex 5mio, ODVA	BCC M414-M414-6D-338-ES64N9-_ _ _	BCC M414-E894-8G-672-ES64N9-_ _ _
		TPE	FT1	BCC M414-M414-6D-338-ES64N8-_ _ _	
Shielded Starquad	Stranded	PUR	Profinet	BCC M414-M414-6D-331-PS54T2-_ _ _	BCC M414-E834-8G-668-PS54T2-_ _ _

Cable Type	Conductor	Jacket	Ratings	RJ45 to RJ45	Bulk Cable (100m)
Unshielded UTP 2 pair	Stranded	TPE	600V, CMX Flex 10mio,ODVA	BCC E894-E894-90-367-EX64N9-_ _ _	**BCC0CN3**
Shielded STP 2pair	Stranded	PVC	Riser, CMR, ODVA	BCC E894-E894-90-339-VS64N9-_ _ _	**BCC0AZ9**
		TPE	Flex 5mio, ODVA	BCC E894-E894-90-339-ES64N9-_ _ _	**BCC0AUJ**

*Contact factory for availability
Standard lengths available:

006 = 0.6 m	100 = 10.0 m	400 = 40.0 m
010 = 1.0 m	150 = 15.0 m	500 = 50.0 m
020 = 2.0 m	200 = 20.0 m	600 = 60.0 m
050 = 5.0 m	300 = 30.0 m	

For aux power cables and accessories, see Network Catalog

Receptacles and Bulkheads

Order Code	Description
BCC03WP	M12-RJ45 Receptacle, 2m, industrial Ethernet
BCC06YP	M12-M12 Female Bulkhead
BCC085F/BCC03WW	M12-RJ45 Straight Bulkhead
BCC085H/BCC03WY	M12-RJ45 Right Angle Bulkhead
BCC08KW	M12 D-coded, Shield Break Plug

Field Attachables

Order Code	Description
BCC03WZ	M12, D-coded, Straight Male
BCC03Y0	M12, D-coded, Right-Angle Male
BCC03Y1	M12, D-coded, Straight Female
BCC03Y2	M12, D-coded, Right-Angle Female
BCC06FH	RJ45, Straight Male, 8-position, 4wire

- Clearly visible status LEDs
- Addressable display
- Powerful and safe outputs
- Innovative housing design

CC-Link is the principle fieldbus technology used in Asia. The open network is supported by the global CC-Link partner association CLPA, which comprises more than 1000 companies. CC-Link is a standardized fieldbus designed to integrate different automation components from a wide range of providers. CC-Link is an effective integral system that will fulfill 100 % of your application requirements. Utilize the extensive, high-quality CC-Link portfolio from Balluff to implement your own powerful control topologies using products from a single source.

CC-Link with IO-Link functionality
A module with four IO-Link ports is now available to supplement the CC-Link fieldbus module product series.

The CC-Link module with IO-Link includes four IO-Link master ports that can be configured and used fully independently of one another. You get four additional, freely configurable standard I/O ports that provide a further eight inputs/outputs for standard sensors and actuators.

Fieldbus	CC-Link	CC-Link
Type	4× IO-Link, 12 DI/DO PNP	16 DI NPN
Ordering code	**BNI0040**	**BNI0049**
Part number	BNI CCL-502-100-Z001	BNI CCL-106-100-Z001
Operating voltage U_B	18...30 V DC	18...30 V DC
Function indicator	Green LED	Green LED
Fault function indicator	Red LED	Red LED
Power indicator	Green LED	Module/actuator/sensor supply
Connection: Fieldbus	M12, 5-pin, female and male	M12, 5-pin, female and male
Connection: Operating voltage	7/8", 5-pin, female and male	7/8", 5-pin, female and male
Connection: I/O ports	M12, A-coded, female	M12, A-coded, female
No. of I/O ports	8	8
Number of inputs	max. 12 PNP	16 NPN
Number of outputs	max. 12 PNP	
Configurable inputs/outputs	Yes	No
Max. load current sensors/channel	200 mA	200 mA
Max. output load current	1.6 A/2 A	
Port status indicator (signal status)	Yellow LED	Yellow LED
Port diagnostic indicator (overload)	Red LED	Red LED
Total current $U_{Actuator}$	≤ 9 A	≤ 9 A
Total current U_{Sensor}	≤ 9 A	≤ 9 A
Degree of protection per IEC 60529	IP 67 (when connected)	IP 67 (when connected)
Operating temperature T_a	–5...+70 °C	–5...+55 °C
Storage temperature range	–25...+70 °C	–25...+75 °C
Weight	Approx. 577 g	Approx. 577 g
Mounting	2 mounting holes	2 mounting holes
Dimensions (L×W×H)	224×68×36.9 mm	224×68×36.9 mm
Housing material	Nickel-plated Gd-Zn	Nickel-plated Gd-Zn

IO-Link

No. of IO-Link master ports		4× master
Operating modes (3-wire)		SIO, COM 1, COM 2, COM 3
Indicators	Communication	Green LED
	Error	Red LED
Max. load current for IO-Link device		1.6 A

Get Rid of Remote I/O Cabinets Once and For All
Every equipment designer goes through a phase of their design process where they need to decide how their I/O gets from their sensors and their valves to their controller. Some people use I/O cards on their PLC, or networks with IP20 solutions inside remote I/O cabinets.

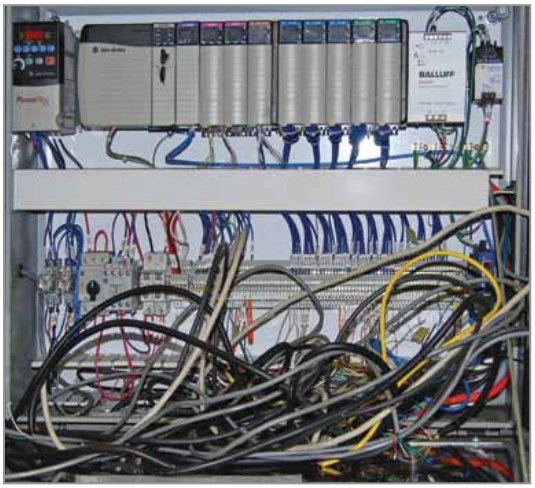
Remote I/O cabinets are costing you money in three ways:

1. **Initial Equipment Costs**
   You have to purchase a remote NEMA Box, bulkhead pass through connectors or gaskets, the remote I/O network connection as well as the required input and output cards for the application.

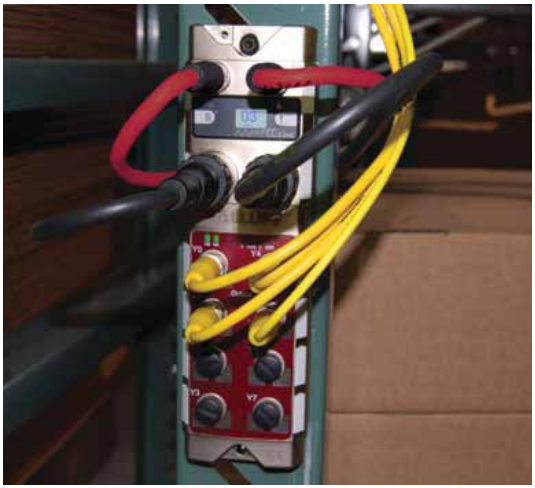
2. **Installation Time**
   The box needs to be mechanically mounted in its designated space and installed with all of the wires and connectors run to it. An electrician then needs to come in and wire everything to the I/O ports. If you are using PNP or NPN sensors, there are three terminations per sensor that the electrician needs to connect.

3. **Setup Time**
   If for some reason the machine needs to be torn down and shipped someplace else (which many machines do), many hours can be spent disconnecting the I/O only to be reassembled in the final destination.

These costs in time and money can be reduced by looking at industrial network I/O mounted right on the machine. IP67 I/O gives quick industrial connection for the network communication and power cables. Most of the sensor and actuator cables can stay with the block because the I/O block is mounted right on the machine where the I/O is needed. Look at the labor and money you are putting into your remote I/O boxes and consider machine mount I/O the next time you are working on designing cost out of your machine.



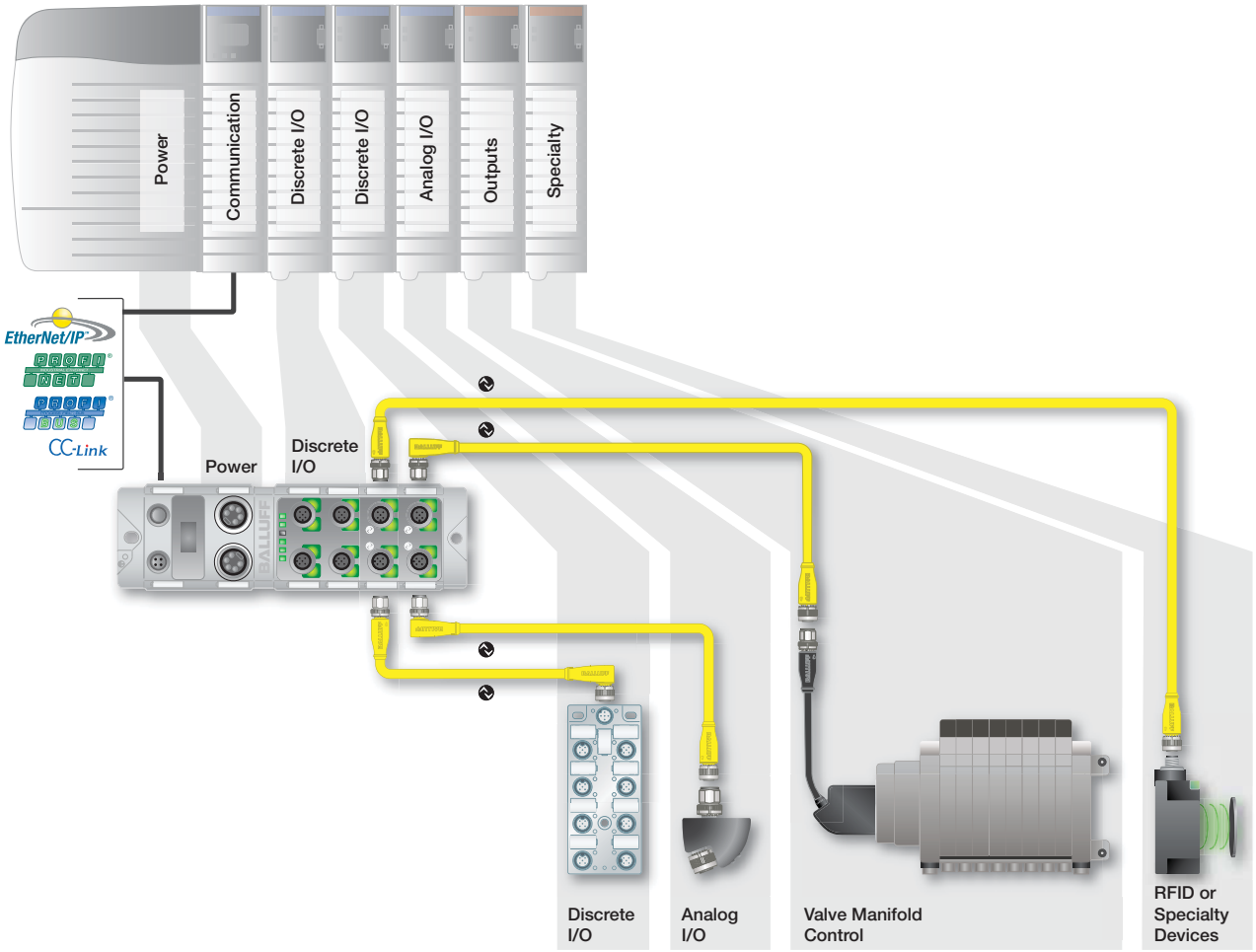
Before



After

Think of a remote “slice” I/O solution. In a typical application, the communication head and the power supply sit on the left hand side and are followed along the backplane by the individual I/O devices, such as discrete 24V input cards or 0-10V analog cards. Usually there are a limited number of slots available in the backplane and individual slices of control components can be inserted.

In a similar fashion, a Distributed Modular I/O system has a communications head that talks over the desired industrial network on one side and acts as a data collector on the right hand side. In lieu of a backplane, each device is connected to an industry standard M12 port utilizing a basic 3-wire sensor cable for communication. With the ability to be installed within a 20 meter radius from the data collector devices can be easily distributed across the machine.



Distributed Modular I/O
IO-Link

The backplane of Distributed Modular I/O = IO-Link

Utilizing a widely accepted and open point to point technology, IO-Link, a Distributed Modular I/O system is fieldbus independent, is easily configured and is vendor neutral. Process data shows up as simple packets of bytes in the controller for easy integration. The parameterization data allows the devices to be quickly configured using simple read/write commands, and best of all, there is no “sub-bus” to cause headaches, nor is there some new protocol to be educated on. The digital signal is carried over pin 4 of a standard cable and 24V power is provided to the device in a standard configuration. If required, the IO-Link port can be used for a standard I/O point.

3 Wire or 4 Wire Sensor Cable

Types of Distributed Modular I/O devices

Discrete I/O

M8 ports
– *Up to 16 inputs*

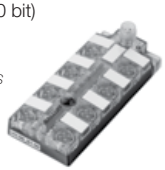
M12 ports
– *Up to 16 inputs*
– *16 outputs*
– *16 configurable*

IP20 terminals
– *Up to 16 configurable*

Analog I/O

1 channel (14 bit)
– *0-10 V in/out*
– *4-20mA in/out*
– *PT100 in*

4 channels (10 bit)
– *0-10 V in*
– *4-20mA in*
– *plus 8 inputs*



Valve Manifold Control

25 pin D-sub

IP67 & Terminal

Specialty Devices and RFID

Intelligent sensors

RFID
– *Read/write*
– *Read only*

Non-contact connectors
– *3 bytes to 11 bytes*

IO-Link sensor hubs with ID

Simple handling – lower costs – universal use

IO-Link sensor hubs with ID from Balluff are a market innovation. The user can write and read his own, user-defined identification data. They are, therefore, particularly economical when it is necessary to encode tools. In addition, they are easy to use.

As an interface for interchangeable tools, they offer clearly calculable benefits:

- Quick, reliable format changes
- Quick, economical installation
- Speedy setup

Additional advantages

- IP 67 sensor hubs are extremely versatile.
- Single-channel monitoring provide detailed diagnostic data relating to overloads, short circuits and cable breaks.

ID sensor hubs from Balluff represent more than just lower costs, less work and reduced downtimes. Sensor hubs with ID from Balluff also stand for greater efficiency.

CE

IO-Link

ID

ID

IO-Link		Device	Device
Type		16× DI	16× DI/DO
2 bytes	**Ordering code**	**BNI003T**	**BNI0048**
ID data	Part number	BNI IOL-104-S01-Z012-C01	BNI IOL-302-S01-Z013-C01
4 bytes	**Ordering code**	**BNI005P**	
ID data	Part number	BNI IOL-104-501-Z012-C02	
Operating voltage U_B		18...30 V DC	18...30 V DC
Function indicator IO-Link RUN		Green LED	Green LED
Power indicator		Green LED	Green LED
Connection: IO-Link		M12, A-coded, male	M12, A-coded, male
Connection: I/O ports		M12, A-coded, female	M12, A-coded, female
Connection U_O		via IO-Link interface	via 7/8" connector
Connection U_A			via 7/8" connector
No. of I/O ports		8	8
Number of inputs		16	Max. 16
Number of outputs		0	Max. 16
Configurable			Yes
Single-channel monitoring		Yes	Yes
Max. load current sensors/channel		100 mA	500 mA
Max. load current actuators/channel			2 A
Port status indicator		Yellow/red LED	Yellow/red LED
Total current U_B		< 1.4 A	9 A
Total current U_A			9 A
Degree of protection per IEC 60529		IP 67 (when connected)	IP 67 (when connected)
Operating temperature T_a		–5...+70 °C	–5...+70 °C
Storage temperature range		–25...+70 °C	–25...+70 °C
Mounting		2 mounting holes	2 mounting holes
Dimensions (L×W×H)		181×68×36.9 mm	181×68×36.9 mm
Housing material		Nickel-plated Gd-Zn	Nickel-plated Gd-Zn

IO-Link

Max. cycle time		15 ms	30 ms
IO-Link process data length		6 input bytes	10 byte input/2 byte output
Indicators	Communication	Green LED, pulsing	Green LED, pulsing
	Error	Red LED	Red LED

All hubs include 4 screw plugs and 1 label set.

IO-Link
Tool ID and I/O device

Application: Die Identification and I/O on a Press

In a metalforming and stamping facility, there is usually the need to change out dies and tooling in the press on a regular basis. Tracking the die ID is becoming an important piece of information in every press shop. Many die ID programs implement a simple input-based system that has a code of sorts built into a high density pin connector. This 24-pin connector also collects a small set of I/O data on the press. This solution has a high initial cost due to the 24-wire cable and the special wiring configurations that need to be made. Then once implemented the pin connectors inside get damaged or bent causing downtime to repair the connectors. Damage to these connectors from die change or from daily use can cause significant downtime. Balluff offers a rugged solution for quick die changes that collect I/O data as well as provide die identification information all in one simple-to-implement package.

Benefits:

- Decreases wiring time and mistakes by using standard wiring for all dies
- Eliminates pin damage by using a non-contact connector
- Eliminates die rework due to operator forgetting to unplug connector
- Increases data reliability using Industrial RFID for die identification

Basic Solution: An I/O hub for identification can easily be integrated into the existing industrial network on the press or straight into the controller using an IO-Link expansion module. IO-Link is an open standard that is adopted by many major controller manufacturers and allows for smart devices to communicate with the controller and collects more information about the process than just I/O. IO-Link expansion modules can work with EtherNet/IP, ProfiNet and Profibus and can communicate with up to 4 IO-Link devices simultaneously. The I/O hubs are available with diagnostics and 2 bytes of ID data, as well as 16 inputs or can drive up to 16 outputs. This allows for greater flexibility right on the die for any die protection program in effect in the facility.

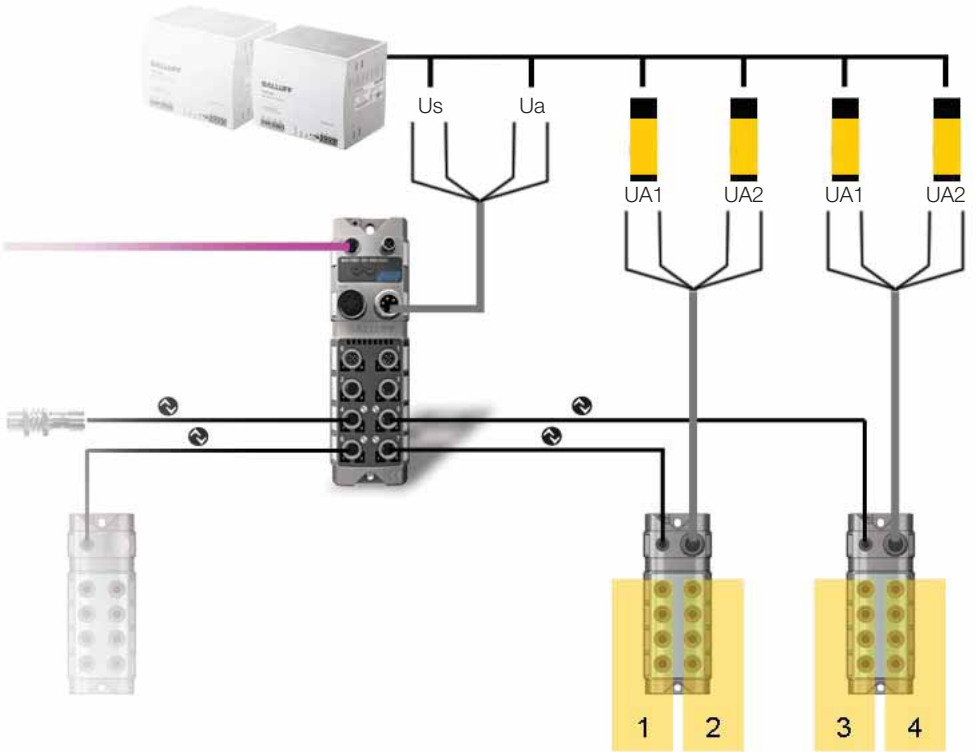
Enhanced Solution: In addition to replacing high density connectors and cables, there can be issues with operators forgetting to disconnect the wired connectors. This requires costly die repair due to cable damage of the die protection sensors and devices. To alleviate this problem, a non-contact connector solution can be implemented that will power the sensors in use on the die as well as collect the I/O and ID data. The non-contact connector transmits power and data across a small air gap and communicates back to the IO-Link expansion module. This removes any need for the operator to remember to disconnect the homerun cable when changing out a die. See page 160 for non-contact connectors.

- Robust housing
- Powerful outputs
- Two isolated zones of output control

If you wish to depict standard I/Os or safety I/Os in a fieldbus topology, the issue of safety becomes increasingly important for network/system integration.

Type BNI IOL-252/256 IO-Link actuator hubs fulfill requirements relating to the safe deactivation of outputs in accordance with Machinery Directive 2006/42/EC, EN 954-1 category 3, EN 13849-1, EN 62061 SIL2.

The I/O block is divided into two galvanically isolated segments in order that two separately switching circuits can be implemented using one module. The functions of the IO-Link system concept are extended considerably as a result. The IO-Link fulfills the requirements for a holistic approach and simultaneously reduces the number of components and guarantees simpler installation.



IO-Link
Metal M12 actuator hubs, Isolated output control

IO-Link	Device	Device	Device
Type	2×4×DO	2×8×DO	2×8×DO
Ordering code	**BNI0033**	**BNI0034**	**BNI003Y**
Part number	BNI IOL-252-000-Z013	BNI IOL-256-000-Z013	BNI IOL-256-S01-Z013
Operating voltage U_B	18...30 V DC	18...30 V DC	18...30 V DC
Function indicator IO-Link RUN	Green LED	Green LED	Green LED
Power indicator	Green LED	Green LED	Green LED
Connection: IO-Link	M12, A-coded, male	M12, A-coded, male	M12, A-coded, male
Connection: I/O ports	M12, A-coded, female	M12, A-coded, female	M12, A-coded, female
Connection U_O	via 7/8" connector	via 7/8" connector	via 7/8" connector
Connection U_A	via 7/8" connector	via 7/8" connector	via 7/8" connector
No. of I/O ports	8	8	8
Number of outputs	8	16	16
Configurable	No	No	No
Single-channel monitoring	No	No	Yes
Number of output circuits	2	2	2
Outputs per output circuit	4	8	8
Single-channel monitoring	No	No	Yes
Max. load current actuators/channel	2 A	2 A	2 A
Port status indicator	Yellow/red LED	Yellow/red LED	Yellow/red LED
Total current U_B	9 A	9 A	9 A
Total current U_A	9 A	9 A	9 A
Degree of protection per IEC 60529	IP 67 (when connected)	IP 67 (when connected)	IP 67 (when connected)
Operating temperature T_a	–5...+70 °C	–5...+70 °C	–5...+70 °C
Storage temperature range	–25...+70 °C	–25...+70 °C	–25...+70 °C
Mounting	2 mounting holes	2 mounting holes	2 mounting holes
Dimensions (L×W×H)	181×68×36.9 mm	181×68×36.9 mm	181×68×36.9 mm
Housing material	Nickel-plated Gd-Zn	Nickel-plated Gd-Zn	Nickel-plated Gd-Zn

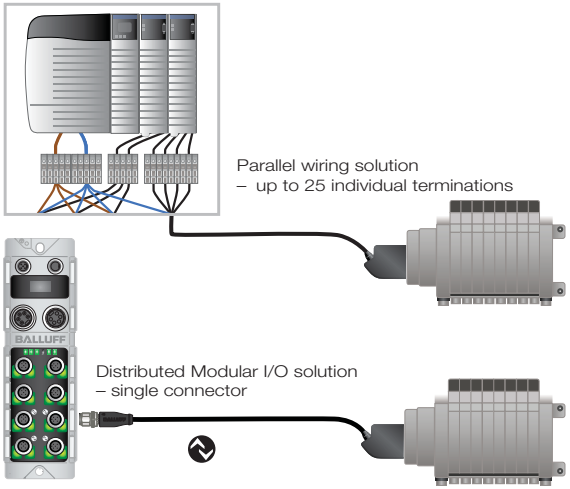
IO-Link

Max. cycle time		2.5 ms	5 ms	20 ms
IO-Link process data length		1 output byte	2 output byte	5 input bytes/2 output bytes
Indicators	Communication	Green LED, pulsing	Green LED, pulsing	Green LED, pulsing
	Error	Red LED	Red LED	Red LED

All hubs include four screw plugs and label set.

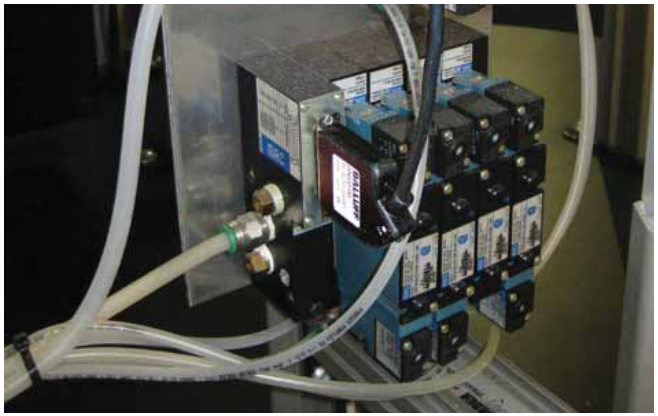
When controls engineers get involved in specifying valve manifolds a slippery slope can develop. Where does the mechanical design end and the electrical design begin? Being able to order simple valve manifolds with 25-pin D-sub connectors removes this situation and provides multiple advantages: these valves are low cost, they are simple to wire and they are typically standard off the shelf components so they are easy to repair. But terminating the 25 wires and trying to troubleshoot these multiple connections can be time consuming and costly. By utilizing an industrial network and a Distributed Modular I/O valve manifold connector, cost and time of installation and repair can be dramatically reduced.

- Max 0.7A per output and up to 1.1A total can be active at once
- Connector provides a 0V common on pin 25 and 24V signals
- Up to 16 output positions can be controlled per manifold
- Up to 4 manifolds can be controlled per master device
- Communication speeds between the master and valve control of 2ms



Valve Mainifold Control over EtherNet/IP

In this conveyor application, a few cylinders are being used for gate control to help sort packages as they come through the process. The valve manifold has a simple 25pin D-sub connector controlling 7 positions on the conveyor. Controlling the valve manifold is a 25pin D-sub valve manifold controller with IP40 protection. This connector is then plugged into an EtherNet/IP master device and the controller sees the valve manifold over the network as a simple 2 bytes of output data. An auxiliary power output, from the master, controls the device power and can turn on or off control to the outputs when necessary. Four manifolds can be controlled on one EtherNet/IP master and the manifolds can be up to 20 meters from the master device.



IO-Link

Metal M12 actuator hubs, Isolated output control

Control by Manufacturer	Connector Type	Max Positions	Balluff Ordering Code Balluff Part Number	Accessory	Accessory Description
MAC Valve Manifolds					
MAConnect	D-sub 25pin	16	**BNI001L** BNI IOL-751-V02-K007		
Bosch Rexroth Valve Manifolds					
LS04, HFO2-LG, HFO3-LG, HFO4	D-sub 25pin	24	**BNI001K** BNI IOL-751-V01-K007		
Festo Valve Manifolds					
MPA, VUVB	D-sub 25pin	24	**BNI001K** BNI IOL-751-V01-K007	**BAM01RC** BAM PC-NI-009-4	For some models, cover plate
CPV	D-sub 25pin	8	**BNI001L** BNI IOL-751-V02-K007	**BAM01RC** BAM PC-NI-009-4	For some models, cover plate
SMC Valve Manifolds					
FD0 connector kit	D-sub 25pin	24	**BNI001M** BNI IOL-751-V03-K007		
MD0 connector kit	M26 26pin	24	**BNI004W** BNI IOL-770-V06-A027		
Numatics Valve Manifolds					
AKJ connector	D-sub 25pin	22	**BNI001M** BNI IOL-751-V03-K007	**BCC0CKE** BCC D43T-D43T-30-RA051-000	Adapter required for all models
AKF terminals	screw terminals	16	**BNI005M** BNI IOL-771-000-K027		
AKR connector kit	M26 26pin	22	**Contact Factory**		
Parker Valve Manifolds					
L2 End Plate Kit D-sub 25pin versions	D-sub 25pin	24	**BNI001M** BNI IOL-751-V03-K007		
Terminal Housing versions	screw terminals	16	**BNI005M** BNI IOL-771-000-K027		
Norgren Valve Manifolds					
VS45	D-sub 25pin	24	**BNI001M** BNI IOL-751-V03-K007		
VS45	screw terminals	16	**BNI005M** BNI IOL-771-000-K027		

Universal IO-Link switch – unlimited options
Via the BNI IOL-771-000-K027 module, all devices are open for IO-Link with up to 16 inputs/outputs.

In a process-related manner, pumps, signal lights, control panels, valve clusters, switch units, transfer units and many more are connected with the control level in the simplest way. The module provides both the fast IO-Link connection via the standard sensor line and an open cable with 18 wires.
With it, now any electric unit with up to 16 inputs/outputs can be connected to the control system via a standard sensor cable.

The benefits to you
- Compact adapter housing for direct connection to different devices
- Via IO-Link, universal and fieldbus-independent
- Connection to control level with common sensor cable, reduces the wiring effort
- Variant available with 16 input/output signals

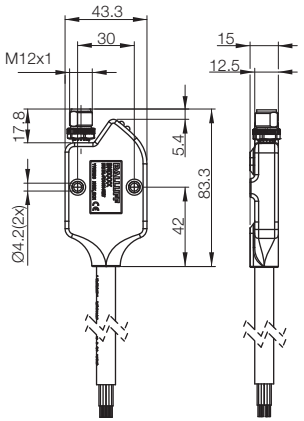
IO-Link
Universal IO-Link device

New

Connector diagram and wiring IO-Link interface, M12, A-coded, pin	 PIN 1: +24 V, supply voltage PIN 2: Not connected PIN 3: GND, reference potential PIN 4: Q/C, IO-Link data transmission channel Pin 5: Function ground
Version	IO-Link on switch
Supply voltage U_B	18...30.2 V DC
Indicators and monitoring	Power supply, communication, diagnostics
Transmission protocol	IO-Link Version 1.1
Transfer rate	COM2 (38.4 Kbaud)
Cycle time min.	4 ms
Operating temperature T_a	–5 to +75 °C
Storage temperature	–25 to +85 °C
Dimensions	83.3×43.3×15 mm without cable
Housing material	Plastic
Total current U_O	1.2 A
Degree of protection	IP 54

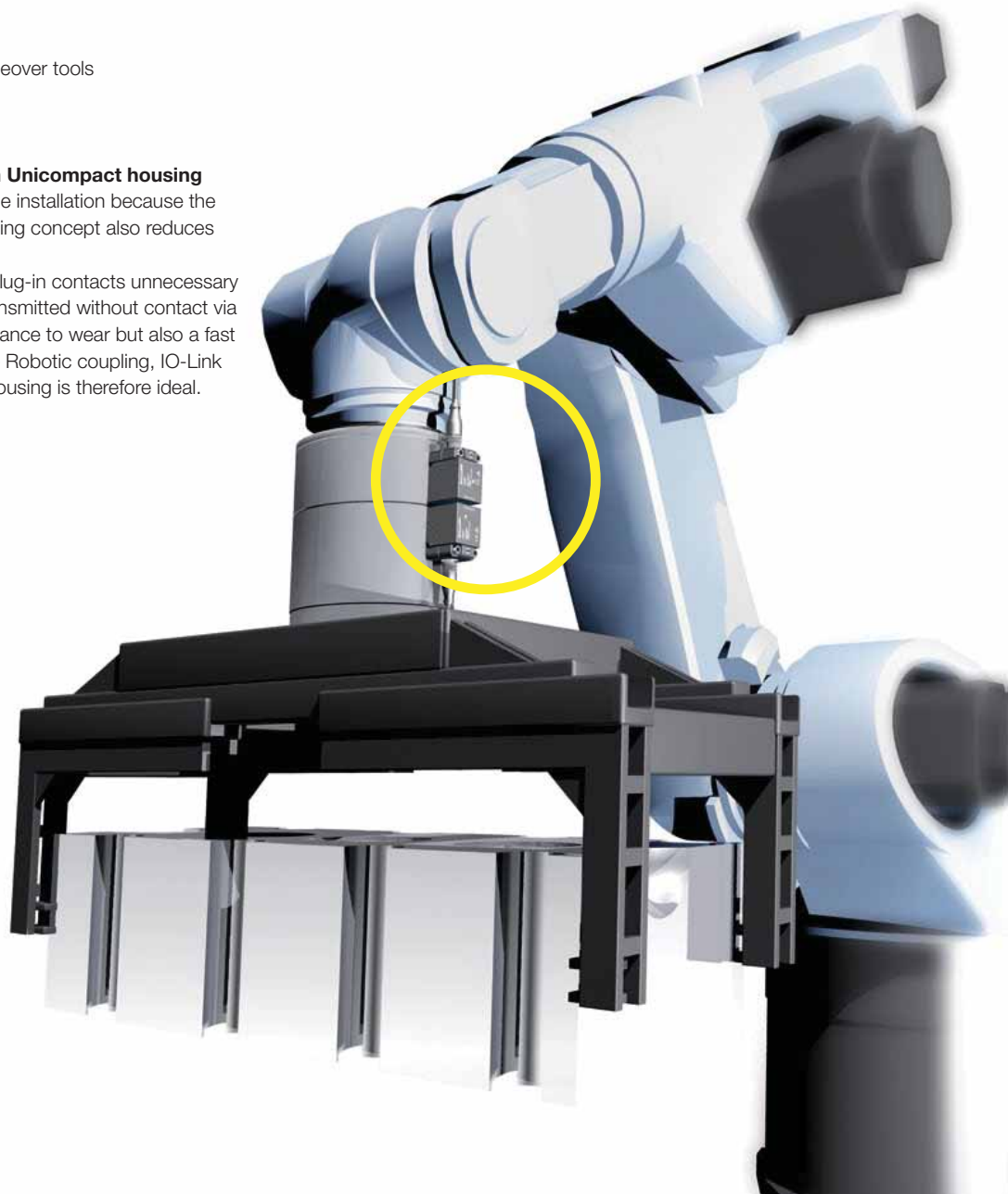
Cable material	Color	Length	Ordering code
			Part number
PVC	Gray	0.4 m	**BNI005M**
			BNI IOL-771-000-K027

Signal assignment M27 socket round plug
in accordance with SMC-VQC valve clusters



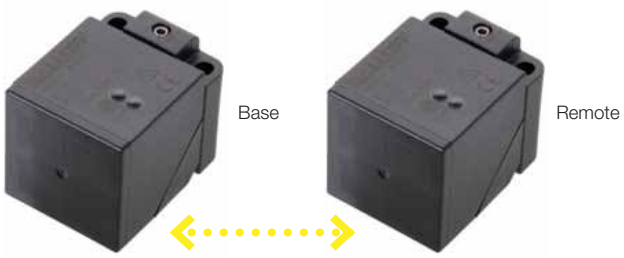
- No mechanical wear
- Maintenance-free
- Increased system availability
- Shorter times when replacing changeover tools
- Simplification of system design
- Simple wiring of replaceable tools

IO-Link unidirectional in 40×40 mm Unicompact housing
The IO-Link interface guarantees simple installation because the IO-Link is quickly wired. The new housing concept also reduces interfering variables.
Inductive couplers make mechanical plug-in contacts unnecessary because the signals can be reliably transmitted without contact via an air gap. This ensures not only resistance to wear but also a fast size change and high flexibility. For the Robotic coupling, IO-Link unidirectional in the compact 40×40 housing is therefore ideal.



Inductive Couplers

IO-Link unidirectional in 40x40 mm Unicompact housing



Size	**40×40×63 mm**	**40×40×63 mm**
Working range	1 mm...5 mm	1 mm...5 mm
Ordering code	**BIC005A**	**BIC005C**
Part number	BIC 1I0-I2A50-Q40KFU-SM4A4A	BIC 2I0-I2A50-Q40KFU-SM4A5A
Operating voltage U_B incl. residual ripple	24 V DC ±10 %	
Rated operating current I_e	1000 mA	
No-load supply current I_0 max.	100 mA	
Max. current load per output		800 mA
Short-circuit protected	Yes	Yes
Remote output voltage		24 V DC ±5 %
Power supply, continuous output current		500 mA
Operational readiness		< 100 ms
Ambient temperature T_a	–5...+55 °C	–5...+55 °C
Storage temperature range	–25...+70 °C	–25...+70 °C
Transmission distance	0...5 mm	0...5 mm
Function/Power indicator	Yes/yes	Yes/yes
Weight	Approx. 160 g	Approx. 160 g
Degree of protection per IEC 60529	IP 67	IP 67
Housing material	PBTP	PBTP
Material of sensing face	PBTP	PBTP
Connection	M12 connector, male 4-pin, A-coded	M12 connector, female 5-pin, A-coded

IO-Link

Mode	COM 2	COM 2
Transfer rate	38.4 kbaud	38.4 kbaud
Cycle time min.	3 ms	3 ms
Process data cycle	12 ms at minimum cycle time	
Frame type	1	1

Advantages of intelligent sensors

As manufacturing becomes even more competitive and the demand for flexibility rises, we begin to ask tough questions to ourselves, our machine builders and our component suppliers:

- How do I increase my production throughput and maintain quality?
- How can I predict sensor or machine failure?
- What can I do to decrease my unplanned downtime?
- Where and how often are most failures occurring?
- How do I get more detailed information out of the system?

The ideal solution to these questions is a system that can easily provide status information from the health of a PLC and industrial network down to the individual sensor location at one work station. The system could predict impending issues and automatically direct action to solve the issue before it causes production to stop. In addition the system should be able to be flexible and adjust to multiple configurations, sizes, colors, etc.

Intelligent sensors are part of this solution. By providing Constant Condition Monitoring, Preventative Diagnostics and Automatic Configuration over common industrial networks, intelligent sensors provide the flexibility and detailed data required in a modern manufacturing facility.

Detailed sensor information
Exact failure location

"I'm working!"

Constant Condition Monitoring

Over the industrial network
Sensor health indication
Standard indication (ON/OFF, measurement,etc.)

Decreasing unplanned downtime
Predicting failures

"Something changed!"

Preventative Diagnostics

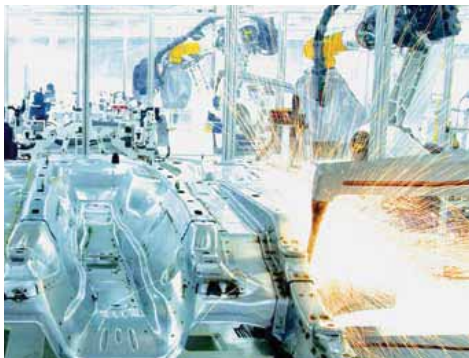
Unstable application diagnostics
- **Dirty lens**
- **Target too close**
- **Target outside ideal range**

Increasing equipment throughput
Increasing process reliability
Maintaining high quality

"Tell me what to do!"

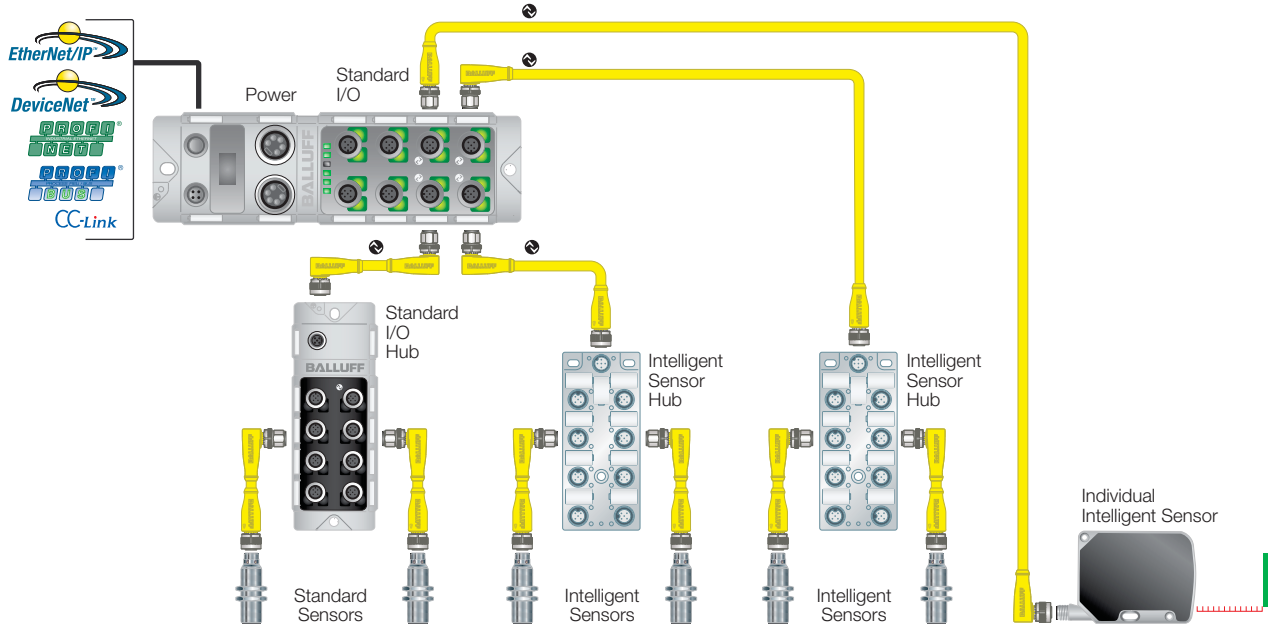
Automatic Configuration

Parameter configuration
- **Remote program from the PLC**
- **Multiple Configurations stored on the PLC**
- **Control over features and functions**



Intelligent Sensors
Types of intelligent sensors

Using Distributed Modular I/O technology and talking over the same backplane from slave to master device, multiple intelligent sensors can be connected to one IP address on an industrial network. Depending on the complexity of the information the sensor provides or requires, any combination of 1 to 32 intelligent sensors can be connected. Utilizing the open standard IO-Link, it is also possible to mix and match with any Distributed Modular I/O products available such as: discrete I/O, analog I/O, valve manifold control, RFID and third party intelligent sensors and devices.

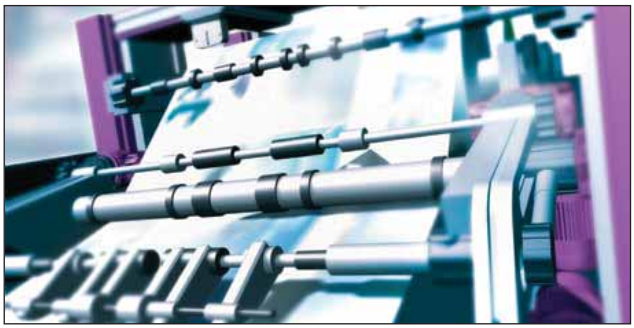


	Standard Sensors	Level 1 Intelligent sensors	Level 2 Intelligent sensors	Level 3 IO-Link Intelligent sensors
Maximum sensors per IP address	16 per hub 12 per master 76 per IP address	8 per hub 0 per master 32 per IP address	8 per hub 0 per master 32 per IP address	4 per master 4 per IP address
Available functions	ON OFF	ON OFF; Constant Condition Monitoring	ON OFF; Constant Condition Monitoring; Preventative Diagnostics	Measure; Constant Condition Monitoring; ON OFF; Preventative Diagnostics; Automatic Configuration
Balluff brands	**Standard Sensors**	DESINA **Sensors**	Dynamic Sensor Control **Sensors**	IO-Link **Sensors**

Applications

Printing and Paper Example

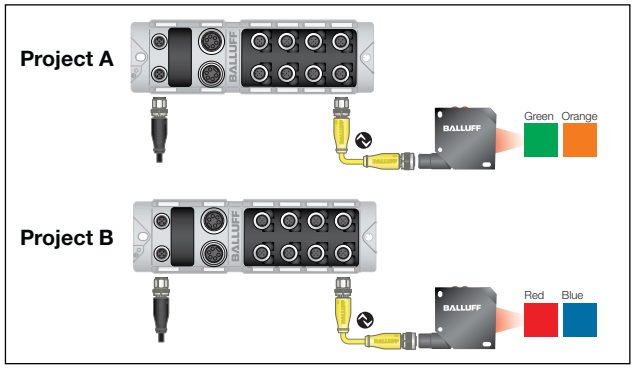
Reliable diagnostics are extremely important for highly dynamic machines. You can identify quality issues linked to the manufacturing process in real-time and take appropriate measures immediately. In the printing and paper machine industry, for example, the machine must react to faults within milliseconds.



Color Sensor Example

While running project A, the color sensor is configured to detect the difference between five different colors as parts are loaded into a fixture.

After the required parts are run off, a new project is begun with a different color set. In the past, a second color sensor would be required, or the operator would have to reprogram the current sensor for each new color. By using device parameterization, the controller tells the sensor its configuration for project B and quickly, without hassle, the sensor has its new colors.



Intelligent sensor hub

IO-Link	Device
Type	8× DSC or 8× I
Ordering code	**BNI002Z**
Part number	BNI IOL-530-000-K006
Operating voltage U_B	18...30 V DC
Connection: IO-Link	M12, A-coded, male
Connection: I/O ports	M12, A-coded, female
No. of I/O ports	8
No. of DSC ports	8
No. of digital inputs	8
Max. load current sensors/channel	200 mA
Total current U_B	< 1.2 A
Degree of protection per IEC 60529	IP 67 (when connected)
Operating temperature T_a	–5...+55 °C
Storage temperature range	–25...+85 °C
Dimensions (L×W×H)	115×50×31 mm
Housing material	PC

IO-Link

Operating mode	COM 2
Parameters	– Enable/disable DSC – DSC sensitivity – Diagnostics reset – NC/NO

Capacitive
Ø 20 mm

Ordering code	BCS0001
Part number	**BCS 20MG10-XPA1Y-8B-03***
Switching type PNP complementary	■
Rated switching distance s_n	10 mm
Size, mounting	Ø 20 mm, flush
Operating voltage U_B	10...30 V DC
Function indicator	Yes
Degree of protection per IEC 60529	IP 63
Approvals	CE
Housing material	V2A, EP
Connection	3 m cable PUR, 3×0.25 mm²

ON
OFF

Constant
Condition
Monitoring

*Can be used with the constant condition monitor which provides a status output.

Ordering code BAE006W
Part number BES 113-FD-1

Inductive
M12 sensors

Ordering code	BES02MC	BES02M5	BES02M8	BES02M8
Part number	**BES 113-356-SA6-S4***	**BES 113-3019-SA1-S4***	**BES 113-356-SA31-S4**	
Switching type PNP normally open	■		■	
PNP normally closed		■		
Rated switching distance s_n	3.7 mm		4 mm	
Size, mounting	M12×1, non-flush			
Operating voltage U_B	20...30 V DC			
Function indicator	No			
Degree of protection per IEC 60529	IP 67			
Approvals	CE			
Housing material	Stainless steel			
Connection	M12 connector			

ON
OFF

Constant
Condition
Monitoring

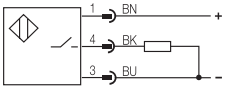
Level 2 intelligent sensors

Inductive M08, M12, M18 and M30 sensors

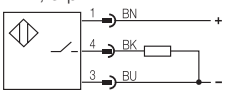
■ **Ordering code**
□ Part number

		BES03EN BES M08EI-PSY15B-S49G-D01	**BES03EP** BES M08EH-PSY25F-S49G-D01	**BES03EL** BES M08EI-PSY15B-S04G-D01	**BES03EM** BES M08EH1-PSY25F-S04G-D01	**BES03ER** BES M12MI-PSY20B-S04G-D01	**BES03ET** BES M12MH-PSY40F-S04G-D01	**BES03EU** BES M18MI-PSY50B-S04G-D01	**BES03EW** BES M18MG-PSY80F-S04G-D01	**BES03EY** BES M30MI-PSY10B-S04G-D01	**BES03EZ** BES M30MF1-PSY15F-S04G-D01
Size		M8	M8	M8	M8	M12	M12	M18	M18	M30	M30
Switching type	PNP normally open	■	■	■	■	■	■	■	■	■	■
Rated switching distance s_n		1.5 mm	2.5 mm	1.5 mm	2.5 mm	2 mm	4 mm	5 mm	8 mm	10 mm	15 mm
Mounting type	Flush	■		■		■		■		■	
	Non-flush		■		■		■		■		■
Operating voltage U_B		18...30 V DC									
Function indicator		Yes									
Degree of protection per IEC 60529		IP 67									
Approvals		CE, cULus									
Housing material		Stainless steel				CuZn coated					
Connection		M8, 3-pin		M12, 3-pin							

M8, 3-pin



M12, 3-pin



ON OFF

Constant **C**ondition **M**onitoring

Preventative **D**iagnostics

BGL fork sensors with Dynamic Sensor Control

Ordering code / Part number		BGL003N BGL 30A-013-S49	BGL003P BGL 50A-013-S49	BGL003R BGL 80A-013-S49
Fork sensor	1× PNP	■	■	■
Fork opening	30 mm	■		
	50 mm		■	
	80 mm			■
Light type	Infrared	■	■	■
Function indicator		Yes		
Repeat accuracy		≤ 0.15 mm		
Connection	Connectors	M8, 3-pin		

ON OFF

Constant **C**ondition **M**onitoring

Preventative **D**iagnostics

Photoelectric sensor BOS 18M Teach-In with Dynamic Sensor Control

		BOS01CU BOS 18M-PUD-RD30-S4	BOS01CT BOS 18M-PUD-PR30-S4	BOS01CW BOS 18M-PUD-RE30-S4	BOS01CY BOS 18M-X-RS30-S4
Retro Reflective		■			
Diffuse			■		
Thrubeam Receiver				■	
Thrubeam Emitter					■
Switching type	PNP NC/NO selectable	■	■	■	
Rated switching distance s_n		500 mm	5 m*	20 m	
Size, mounting		M18			
Operating voltage U_B		10...30 V DC			
Function indicator		Yes			
Degree of protection per IEC 60529		IP 67			
Housing material		Nickel-plated brass			
Connection		M12 connector			

* based on reflector BOS R-1

ON OFF

Constant **C**ondition **M**onitoring

Preventative **D**iagnostics

Level 3 IO-Link intelligent sensors

Inductive Measurement Sensors

Order Code	BAW002F	BAW003A
Part Number	BAW M18MI-BLC50B-S04G	BAW Z01AC-BLD50B-DP03
Range	1...5 mm	1...5 m
Switch Points	0	3
Resolution	± 8 µm	± 10 µm
Analog Value Range	0000...03FF	0000...03FF
Process Data	3 bytes	2 bytes

Measure | CCM: Constant Condition Monitoring

Measure | ON OFF | CCM: Constant Condition Monitoring | PD: Preventative Diagnostics | AC: Automatic Configuration

Inductive Positioning Sensors

Order Code	BIP0004
Part Number	BIP LD2-T040-02-S4
Range	0...40 mm
Target Width	14 mm
Resolution	40 µm
Process Data	2 bytes

Measure | CCM: Constant Condition Monitoring | PD: Preventative Diagnostics

Laser Measurement Sensors

Order Code	BOD0012
Part Number	BOD 63M-LI06-S4
Range	200...6000 mm
Resolution	≤ 1 mm
Repeatability	≤ ± 4 mm
Analog Value Range	00C8...1770
Process Data	3 bytes/1 byte

Measure | ON OFF | CCM: Constant Condition Monitoring | PD: Preventative Diagnostics | AC: Automatic Configuration

Intelligent Sensors

Level 3 IO-Link intelligent sensors

Edge Detection

30 mm	**BGL0035**
	BGL 30C-007-S4
50 mm	**BGL003F**
	BGL 50C-007-S4
Resolution	0.08 mm
Light Spot	28 mm x 3 mm
Air Blowoff	Built-in
Analog Valve Range	0...1024

Measure | ON OFF | Constant Condition Monitoring | Preventative Diagnostics | Automatic Configuration

Color Sensing

Order Code	**BFS000F**
Part Number	BFS 26K-GI-L04-S92
Diffuse Range	12…32 mm
Reflector Range	50…200 mm
Working Colors	5
Process Data	1 byte
Light Spot	Ø4 mm at 22 mm

ON OFF | Constant Condition Monitoring | Automatic Configuration

New

Linear Position Transducer

Ordering Code	
Part Number	BTL6-U100-M_ _ _ _-PF-S4*
Stroke Length	50 mm...4572 mm (2" to 180")
Resolution	5 µm
Analog Value Range	32 bit signed integer

Measure | Constant Condition Monitoring | Preventative Diagnostics | Automatic Configuration

*Consult factory for availability

Ordering Instructions:
M_ _ _ _ = desired stroke length in mm (0051 to 4572)

Mechanical Switches

Part Number	**BNS 819-...**
Housing Series Available	40, 46, 61, 62, 100

ON OFF | Constant Condition Monitoring

IP69K stainless single-ended	
Type	1.4404 Stainless IP 69K
Configuration	Stainless Nut, Yellow Overmold & PVC Cable
Voltage Rating	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12 non-LED), 36 V (M12 LED)
Amperage	4 A

M8 Versions	
M8 Female, 3-wire, Straight	**BCC S313-0000-10-001-VX43T2-_ _ _** (IP67)
M8 Female, 3-wire, Right Angle	**BCC S323-0000-10-001-VX43T2-_ _ _**
M8 Female, 3-wire, Right Angle, N/O PNP-LED	
M8 Female, 4-wire, Straight	**BCC S314-0000-10-003-VX44T2-_ _ _** (IP67)
M8 Female, 4-wire, Right Angle	**BCC S324-0000-10-003-VX44T2-_ _ _**

M12 Versions	
M12 Female, 3-wire, Straight	
M12 Female, 3-wire, Right Angle	
M12 Female, 3-wire, Right Angle, PNP-LED, N/O	**BCC S425-0000-1A-004-VX43T2-_ _ _**
M12 Female, 4-wire, Straight	**BCC S415-0000-1A-003-VX44T2-_ _ _**
M12 Female, 4-wire, Straight, N/O PNP-LED	**BCC S415-0000-1A-008-VX44T2-_ _ _**
M12 Female, 4-wire, Right Angle	**BCC S425-0000-1A-003-VX44T2-_ _ _**
M12 Female, 4-wire, Right Angle, N/O PNP-LED	**BCC S425-0000-1A-008-VX44T2-_ _ _**
M12 Female, 5-wire, Straight	
M12 Female, 5-wire, Straight, Braided Shield	
M12 Female, 5-wire, Right Angle	
M12 Female, 5-wire, Right Angle, Braided Shield	
M12 Female, 8-wire, Straight, Braided Shield	

Standard Lengths Available:
100 = 10.0 meters
200 = 20.0 meters
250 - 25.0 meters

Double-ended		
Type	1.4404 Stainless, IP69K Rated	1.4404 Stainless, IP69K Rated
Configuration	Stainless Nut, Yellow Overmold & PVC Cable	Stainless Nut, Yellow Overmold & PVC Cable
Voltage Rating	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12 non-LED), 36 V (M12 LED)	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12 non-LED), 36 V (M12 LED)
Amperage	4 A	4 A
M12 Female - M12 Male, 4-wire	**BCC S415-S414-3A-304-VX44T2-_ _ _**	**BCC S425-S414-3A-304-VX44T2-_ _ _**
M12 Female - M12 Male, 4-wire, N/O PNP-LED	**BCC S415-S414-3A-606-VX44T2-_ _ _**	**BCC S425-S414-3A-606-VX44T2-_ _ _**

Double-ended		
Type	1.4404 Stainless, IP69K Rated	1.4404 Stainless, IP69K Rated
Configuration	Stainless Nut, Yellow Overmold & PVC Cable	Stainless Nut, Yellow Overmold & PVC Cable
Voltage Rating	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12 non-LED), 36 V (M12 LED)	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12 non-LED), 36 V (M12 LED)
Amperage	4 A	4 A
M12 Female - M12 Male, 4-wire	**BCC S415-S424-3A-304-VX44T2-_ _ _**	**BCC S425-S424-3A-304-VX44T2-_ _ _**
M12 Female - M12 Male, 4-wire, N/O PNP-LED	**BCC S415-S424-3A-606-VX44T2-_ _ _**	**BCC S425-S424-3A-606-VX44T2-_ _ _**

Standard Lengths Available:

003 = 0.3 meters	015 = 1.5 meters
006 = 0.6 meters	020 = 2.0 meters
010 = 1.0 meters	030 = 3.0 meters
	050 = 5.0

New welding PUR line
Standard PUR lines have numerous advantages. They are resilient, wear-resistant, impact-resistant and resistant against solvents. Balluff now also has weld spatter-resistant versions according to ISO 14001 in its product range. This permits the replacement of irradiation-crosslinked lines, which require costly disposal as hazardous waste at the end of their service life. Possible field of applications include automobile manufacturing, in particular, bodyshell work.

- Resistant to sparks and weld spatter
- Degree of protection IP 67 and IP 68
- Conforms with ISO 14001 – not hazardous waste
- Replacement for irradiation-crosslinked lines
- Jacket color: Orange

M8 and M12 Specialty	
Type	Weld Resistant, High Shore PUR
Unique Specification	UL-AWM Style 20549, Orange cable
Voltage Rating	250 VAC / VDC (3&4-wire), 60 VDC (5-wire), 30 VDC (LED)
Amperage	4 A
M8 Versions	
M8 Female Right Angle, 3-wire, PNP-LED, N/O	**BCC M323-0000-10-004-PW334-030**
M12 Versions	
M12 Female Straight, 3-wire	
M12 Female Right Angle, 3-wire	**BCC M425-0000-1A-001-PW3334-_ _ _**
M12 Female Right Angle, 3-wire, PNP-LED, N/O	**BCC M425-0000-1A-004-PW3334-_ _ _**
M12 Female Straight, 4-wire	**BCC M415-0000-1A-003-PW3434-_ _ _**
M12 Female Straight, 4-wire+PE	**BCC M415-0000-1A-034-PW3534-_ _ _**
M12 Female Right Angle, 4-wire+PE, PNP-LED, N/O&N/C	**BCC M425-0000-1A-040-PW3534-_ _ _**

Double-ended		
Type	M12 Female - M12 Male	M12 Female - M12 Male
Configuration	Straight - Straight	Right Angle - Straight
Voltage Rating	125V	125V
Amperage	4A	4A
Conductor Cross-Section	0.34 mm^2	0.34 mm^2
Cable Jacket Material	Orange High Shore PUR, Weld Resistant	Orange High Shore PUR, Weld Resistant
4-wire+PE, non-LED	**BCC M415-M415-3A-313-PW3534-006**	**BCC M425-M415-3A-313-PW3534-006**
4-wire+PE, PNP-N/O & N/C signals	**BCC M425-M415-3A-661-PW3534-006**	

Jacket Materials:
Yellow PVC = VX45T2
Black PUR = PX0534
Yellow TPE = EX45T2

Available Lengths:
003 = 0.3 m
006 = 0.6 m
010 = 1.0 m
015 = 1.5 m
050 = 5.0 m
100 = 10.0 m

Passive splitter box BPI, 5-pin

Ideal areas of application for passive splitter boxes by Balluff include local installations in assembly and handling machines, packaging technology, special machine construction, etc.

Balluff Passive Interface BPI – A multi-talent, even under demanding conditions

- Outstanding design
- Fully enclosed housing
- High shock and vibration ratings
- Flexible mounting options
- High visibility of LEDs
- Large terminal compartment
- Modular design
- Quick to mount/detach for transportation

Type	4-way, M12 with LEDs	8-way, M12 with LEDs
Ordering code	**BPI007K**	**BPI007H**
Part number	BPI 4M4A5P-2K-00-TPSG	BPI 8M4A5P-2K-00-TPSN
Rated power supply U_e	24 V DC	24 V DC
Operating voltage U_B	10...30 V DC	10...30 V DC
Function indicator	Yes	Yes
Power indicator	Green LED	Green LED
Sensor connection	5-pin female, M12×1	5-pin female, M12×1
Controller connection	Cap connection without cable	Cap connection without cable
Number of connections	4	8
Current load capacity	2 A	2 A
Total current	6 A	6 A
Housing material	PBT, GF, fully enclosed	PBT, GF, fully enclosed
Degree of protection per IEC 60529	IP 67 (when connected)	IP 67 (when connected)
Ambient temperature T_a	–25...+80 °C	–25...+80 °C
Version	PNP normally open/normally closed (NO/NC) ⎍ / ⎍	PNP normally open/normally closed (NO/NC) ⎍ / ⎍
Recommended connector - port	BCC M415...	BCC M415...

Sometimes in automation applications it is necessary to wire individual connectors and cables by hand, using bulk cable. It is available for sensors, auxiliary power, and industrial networks.

Lengths Available: 100m coils or spools depending on cable size.

Cable for use with M8 & M12 Connectors & Sensors

# Wires	Conductors	Jacket Material	Wire AWG	Ordering code
3	BR, BU, BK	Yellow PVC	22 AWG	**BCC0AE7**
		Black PUR	22 AWG	**BCC0AE9**
		Black PUR	0.34mm2	**BCC0AC7**
		Yellow TPE	22 AWG	**BCC0AEC**
4	BR, WH, BU, BK	Yellow PVC	22 AWG	**BCC0AE8**
		Yellow PUR	22 AWG	**BCC0AEA**
		Black PUR	0.34mm2	**BCC0AC8**
		Yellow TPE	22 AWG	**BCC0AEE**
5	BR, WH, BU, BK, GY	Black PUR	0.34mm2	**BCC0AC9**

Cable for use with 7/8" Connectors and Aux Power

# Wires	Conductors	Jacket Material	Wire AWG	Ordering code
3	(AC) GN,BK,WH	Yellow PVC	16 AWG	**BCC0AEF**
4	(AC) BK,WH,RD,GN	Yellow PVC	16 AWG	**BCC0AEH**
	(DC) BR,WH,BU,BK	Yellow PVC	16 AWG	**BCC0AEJ**
		Black PUR	1.50mm2	**BCC0ACF**
		Yellow TPE	16 AWG	**BCC0APC**
5	(DC) BK,BU,GN,BN,WH	Yellow PVC	16 AWG	**BCC0AEK**
		Black PUR	1.50mm2	**BCC0ACH**

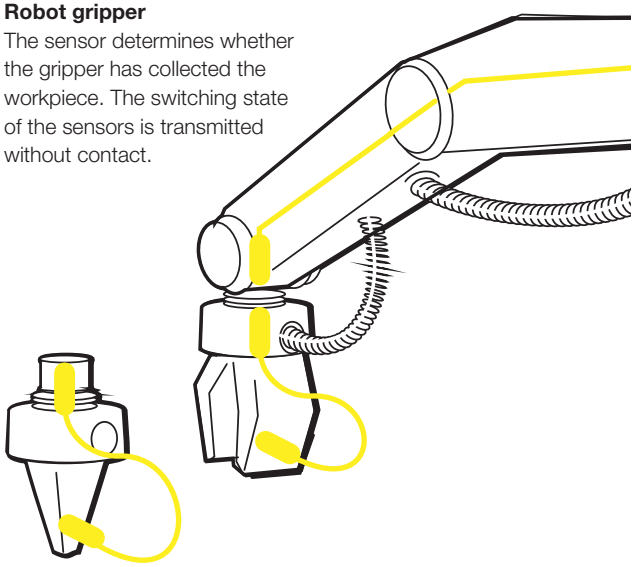
Cable for use with Industrial Networks

# Wires	Network	Jacket Material	Type	Ordering code
2x2	EtherNet/IP	Teal TPE	Shielded	**BCC0AUJ**
		Teal PVC	Shielded	**BCC0AZ9**
2x2+drain	DeviceNet	Grey PVC	Thick	**BCC0AEL**
		Grey PUR	Thick Flex	**BCC0AEM**
		Grey PVC	Mid	**BCC0AEN**
		Grey PVC	Thin	**BCC0AEP**
		Grey PUR	Thin Flex	**BCC0AER**
2	Profibus	Purple PUR		**BCC0ACA**

For a full offering of field attachables and other connectivity accessories, download the connectivity catalog at **www.balluff.com**

- Simple connection, rapid commissioning
- Wear-free
- Robust, even in harsh environments

Robot gripper
The sensor determines whether the gripper has collected the workpiece. The switching state of the sensors is transmitted without contact.



Size	
Working range	
Mounting type	
Ordering code	
Part number	
Operating voltage U_B incl. ripple	
Rated operating current I_e	
No-load supply current I_0 max.	
Max. current load per output	
Short-circuit protected	
Remote output voltage	
Power supply, continuous output current	
Rated insulation voltage U_i	
Operational readiness	
Ambient temperature range T_a	
Storage temperature range	
Displacement	
Switching frequency f	
Function/Power indicator	
Tightening torque	
Degree of protection per IEC 60529	
Housing material	
Material of sensing face	
Connection	

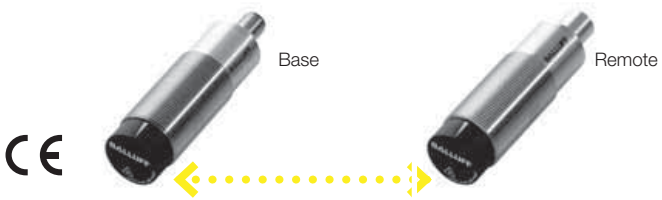
Retrofitting is simple: BIC is plug-and-play. Your maintenance costs are reduced to a minimum because cable breaks and mechanical wear are a thing of the past.

Non-contact Connectors
Power-only

Power-only with 0.2 A power		Power-only with 0.5 A power	
M30×1.5	**M30×1.5**	**M30×1.5**	**M30×1.5**
0...5 mm	**0...5 mm**	**0...5 mm**	**0...5 mm**
Non-flush	Non-flush	Non-flush	Non-flush
BIC0051	**BIC0052**	**BIC0007**	**BIC0008**
BIC 1P0-P2A20-M30MI3-SM4A4A	BIC 2P0-P2A20-M30MI3-SM4A5A	BIC 1P0-P2A50-M30MI3-SM4A4A	BIC 2P0-P2A50-M30MI3-SM4A5A
24 V DC ±10 %		24 V DC ±10 %	
max. 500 mA		max. 1 A	
100 mA		100 mA	
Yes	Yes	Yes	Yes
	24 V DC ±5 %		24 V DC ±5 %
	500 mA		500 mA
150 V DC/125 V AC	150 V DC/125 V AC	150 V DC/125 V AC	150 V DC/125 V AC
	100 ms		100 ms
–5...+55 °C	–5...+55 °C	0...+55 °C	0...+55 °C
–25...+75 °C	–25...+75 °C	–25...+75 °C	–25...+75 °C
	±4 mm		±4 mm
10 Hz	10 Hz	10 Hz	10 Hz
Yes/yes	Yes/yes	Yes/yes	Yes/yes
70 Nm	70 Nm	70 Nm	70 Nm
IP 67	IP 67	IP 67	IP 67
CuZn coated	CuZn coated	CuZn coated	CuZn coated
PC	PC	PC	PC
M12 connector, male 4-pin	M12 connector, female 5-pin	M12 connector, male 4-pin	M12 connector, female 5-pin

For more information on BIC non-contact connectors, refer to our "Industrial Networking and Connectivity" catalog or visit us online at **www.balluff.com**

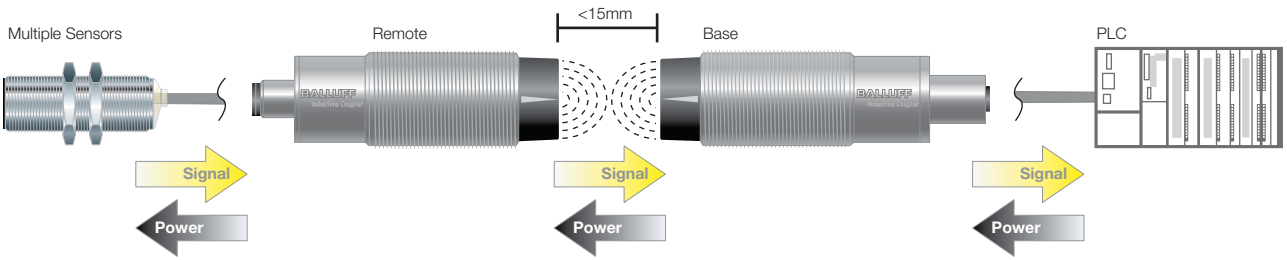
Non-contact Connectors
8 Input



	Uni-standard with 0.5 A power and 8 signals	
Size	**M30×1.5**	**M30×1.5**
Working range	**0...5 mm**	**0...5 mm**
Mounting type	Non-flush	Non-flush
Ordering code	**BIC0009**	**BIC000A**
Part number	BIC 1I3-P2A50-M30MI3-SM4ACA	BIC 2I3-P2A50-M30MI3-SM4ACA
Operating voltage U_B incl. ripple	24 V DC ±10 %	
Rated operating current I_e	max. 1 A	

How Non-Contact Connectors Work

Think of this only as a mechanical connector without pins or the requirement of physical contact. When connected, power goes out to the devices and signals come back from the devices. Depending on the specific product of interest, different information can be passed. Power only, discrete inputs and outputs can be sent across the connectors as well as analog voltage inputs. Each base head is mounted on the controller side of the application and as many remote heads as needed are mounted on the sensors/ actuators side of the application.



Inductive Coupling

Intelligent Power Supplies

Intelligent power supplies from Balluff
The autonomous installation of power supplies without switch cabinets with IP 67 protection is becoming more and more popular in industrial automation. Autonomous power supplies are already widely available but are generally difficult to access once they are installed and to further complicate matters, monitoring the operating status is practically impossible. As a result, operators rely on preventive maintenance concepts to guarantee maximum possible availability. These concepts are reliable but also expensive because devices are frequently replaced during the maintenance cycle well before the end of their service life as there is no alternative system available.

For the first time, intelligent, energy-saving power supplies from Balluff promise to remedy this situation. Their condition is visualized by means of optical indicators.

This novel concept allows detection of the condition of the device at a glance. The device follows dynamic loads and can therefore be operated at a high level of capacity utilization. Usual reserves of 30 to 50 % are therefore superfluous.

This intelligence forms the basis of a new intelligent generation of power supplies that can be permanently utilized at full capacity and provides visual information about the internal status via the:
- Load level
- Stress level
- Lifetime.

Visualization should allow the operator to view the status in the simplest way possible.

IP 67

One special feature is that the three-phase intermediate transformer that is usually installed in wind turbines can be omitted, saving money. A large input voltage range of 380...690 V allows the primary switching power supply to be connected directly to the generator voltage on the wind turbine and then operated normally.

IP 20

General key information about the IP-20 and IP-67 power supplies
- High degree of efficiency > 93 %
- Minimal heat loss and generation
- Increased efficiency of the turbine
- 3-stage status indication
- Power boost (150 % for 4 sec.)
- Extremely compact
- More efficient utilization of the power supplies
- Planned reserves are not wasted
- Prevention of unexpected failures caused by permanent overload
- Scheduled maintenance and repairs no longer necessary
- Higher productivity
- PSU only replaced at the end of its service life
- Lifetime of 15 years (at 80 % load and 40 °C), MTBF > 800,000 h
- Enclosed housing guarantees high degree of resistance to vibration and shock loads

Ideal areas of application for these intelligent power supplies include local installations in the automobile industry, machine construction, wind turbines, etc.

Intelligent power supplies
For outstanding system availability
If you want to operate your systems and machines with maximum efficiency, the power supply you use must be reliable. Intelligent power supplies from Balluff guarantee a high degree of reliability. Wherever you install the power supply unit, you will obtain a complete picture of your environment which you can then monitor continually.

LEDs for easy monitoring
- Load level
- Stress level
- Lifetime

LEDs indicate the load level and stress level so the operator knows immediately when the unit is operating at maximum performance. The service life of the devices is also displayed, making maintenance and operation extremely easy. The operator can also see exactly when a device need replacing, which increases the overall availability of systems.

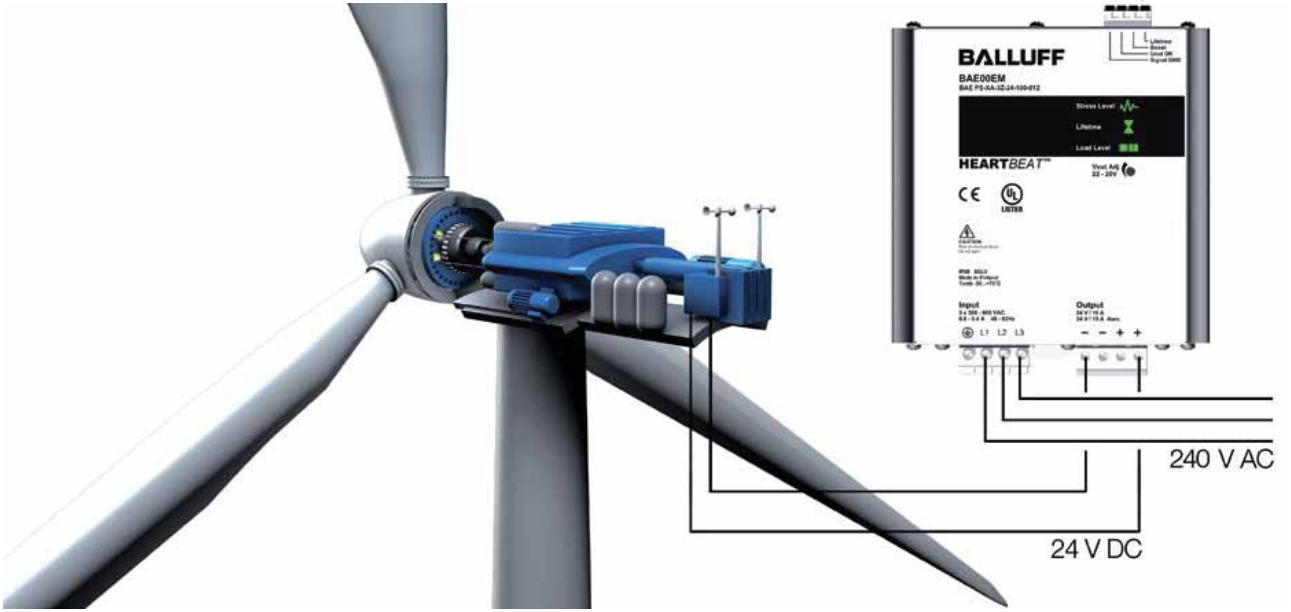
The benefits to you
- Continuous monitoring of machines and systems
- Reliable power supplies guarantee efficient operation
- Optimized use of devices and a longer service life
- Assists with maintenance planning
- Devices only replaced when necessary

Versions
Intelligent power supplies from Balluff are available in two versions

IP 20 (with screw terminal)
- Designed for versatile use in industrial automation
- Direct outputs for diagnostic information

IP 67 (with connector)
- Suitable for direct use in harsh environments
- Fully enclosed housing
- High shock and vibration ratings

Diagnostics



Intelligent Power Supplies
HEARTBEAT

Load level
Reversible in short term

Load level indicates the current load on the device. The display indicates the load without delay.

Stress level
Reversible in medium term

Stress level indicates the physical and thermal loads. A change in the load status delays the "pulse" of the device slightly.

Lifetime
Irreversible in long term

Lifetime indicates the remaining useful life of the device and is based on the combination of all loads.

All indicators multi-colored in green, yellow or red and show the status of the device.

Power Supply
Intelligent power supplies
Inside the cabinet IP20

Inside the Cabinet Intelligent Power Supplies

Output values	**5 A @ 24 VDC (SELV)**	**10 A @ 24 VDC (SELV)**
Input voltage type	Single-Phase	Single-Phase
Output wattage	120 W	120 W
Input voltage	110...240 VAC	110...240 VAC
Ordering code	**BAE00EK***	**BAE00EU**
Part number	BAE PS-XA-1W-24-050-013	BAE PS-XA-1W-24-100-014
Efficiency	> 93 %	> 93 %
MTBF	> 800,000 hrs	> 800,000 hrs
Indicators	DC OK, Lifetime Alarm	DC OK, Lifetime Alarm
Operating temperature	–25...+70 °C	–25...+70 °C
Degree if protection per IEC 60529	IP 20	IP 20
Power boost	150% 4sec	150% 4sec
Mounting	DIN rail	DIN rail

*contact factory for availability

IP67 Power Supplies

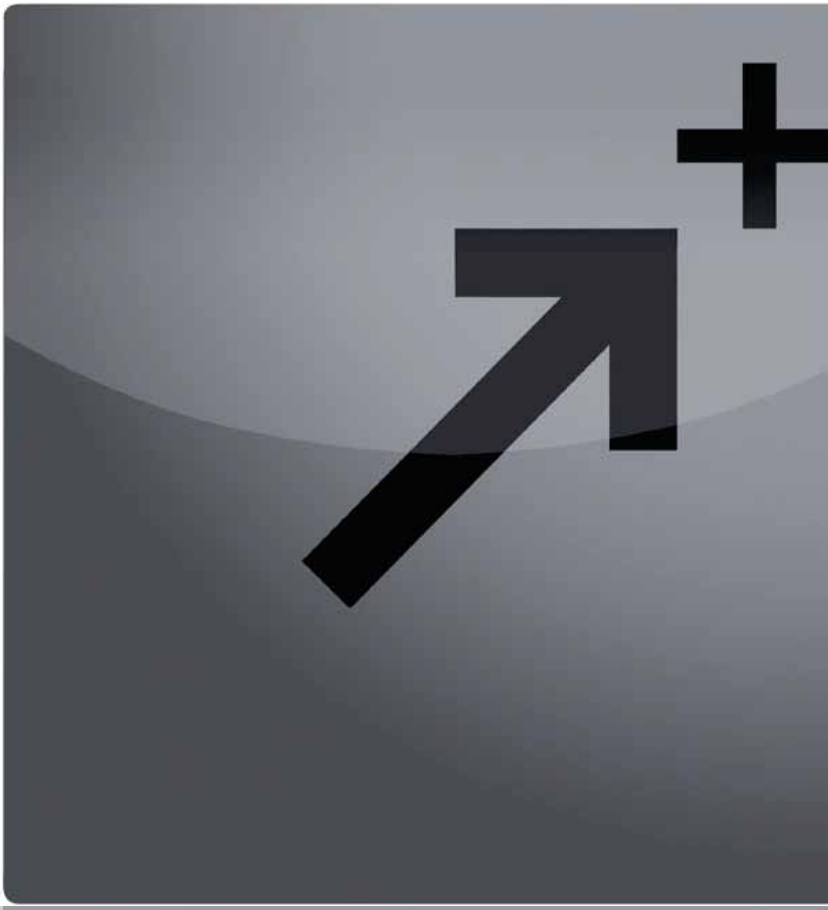
Reliable power for demanding industrial automation, IP67

Machine Mount IP67 Intelligent Power Supplies

Degree of protection per IEC 60529		**IP 67**	**IP 67**
Output current		3.8 A	8 A
Output power		100 W	200 W
Output voltage		24 V DC (SELV)	24 V DC (SELV)
Input voltage		100...240 V AC Single phase	100...240 V AC Single phase
Isolated output (4-pin), DeviceNet Aux, SELV & GND	**Ordering code**	**BAE00EN**	
	Part number	BAE PS-XA-1W-24-038-601	
Isolated output (4-pin), EtherNet IP Aux, SELV	**Ordering code**	**BAE00FW**	**BAE00ET**
	Part number	BAE PS-XA-1W-24-038-607	BAE PS-XA-1W-24-080-604
Grounded output (4-pin), EtherNet IP Aux, PELV	**Ordering code**	**BAE00EP**	**BAE00FY**
	Part number	BAE PS-XA-1W-24-038-602	BAE PS-XA-1W-24-080-606
Isolated output (5-pin), PROFI & CC-Link Aux, SELV & GND	**Ordering code**	**BAE00ER**	**BAE00FL**
	Part number	BAE PS-XA-1W-24-038-603	BAE PS-XA-1W-24-080-605
Efficiency		High efficiency > 93 %	
MTBF		> 800,000 h	
Input		3-pin (male)	
Output		4-pin (female), 2 circuits Optional: 2 connectors for output voltage, each with 2 circuits 5-pin (female), 2 circuits	
Operating temperature		–25...+70 °C	
Storage temperature range		–40...+80 °C	
Mounting		Panel, wall and field mounting	
Housing material		Metal, fully enclosed	
Service life		Almost 15 years	
Warranty		2 years	

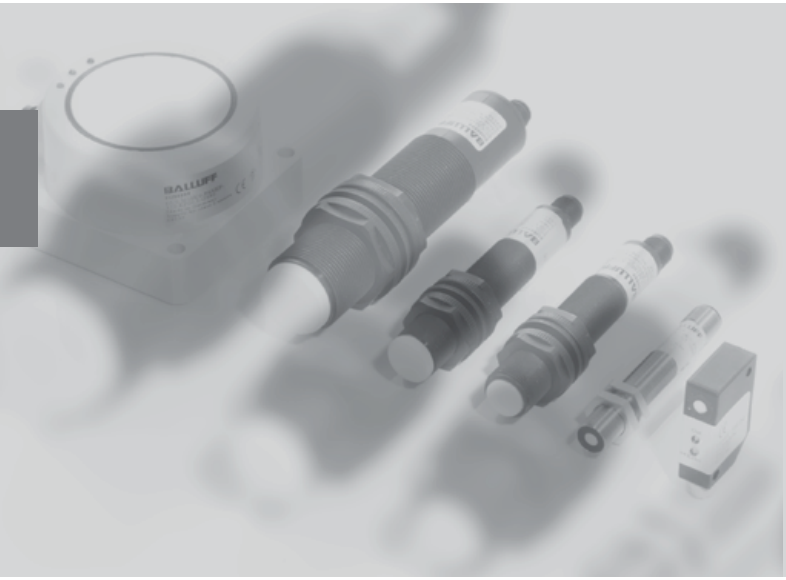
Accessories

Protection Cap
Clamp Holder
Contact Protector
Tube Switch



- Can be used for ultrasonic sensors in the M18 series
- Protects the sensing surface from mechanical load and hot weld spatter
- With a special coating and grid technology, the cooled spatter does not reach the sensing surface and drops out through an outlet

Ultrasonic sensors in welding lines
In a welding line, BUS ultrasonic sensors detect workpieces in the various steps and positions. With the use of a protection cap, the ultrasonic converter is protected from hot weld spatter.



Whether position detection, distance measurement or the detection of solid, powder or liquid media independent of color, transparency and surface finish: ultrasonic sensors are precise and reliable. Particularly when large operating ranges and high accuracies are called for, the BUS ultrasonic sensors show what they are capable of. In dusty, humid and misty working conditions, they are often the only alternative.

- Very large operating range
- For difficult environmental conditions
- Insensitive to dirt
- Object-independent distance measurement
- High resolution
- Small blind spots
- Reliable detection of the smallest of objects
- Detection of sound-absorbing materials

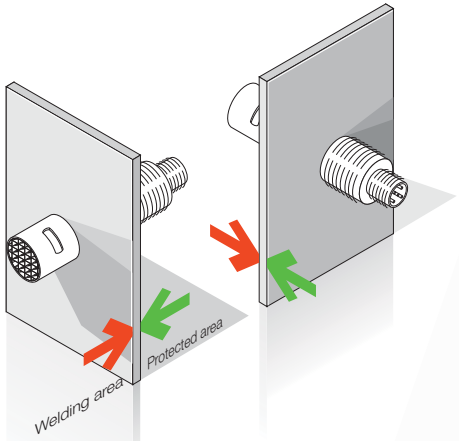
For additional information, see our catalog or visit our website at **www.balluff.com**

Balluff Protection Cap

For ultrasonic sensors in harsh ambient conditions

Installation note

The sensor is pushed through a bore hole and secured in the protected area using a locknut. With this type of installation, only the protection cap is exposed to the harsh ambient conditions.



Size	**M18×1**
Version	Welding protection for M18 ultrasonic sensors BUS
Ordering code	**BAM01LJ**
Part number	BAM PC-US-007-M18-2/W
Housing material	CuBe 2-coated

Usable for ultrasonic sensors BUS M18 with a range of up to 600 mm.

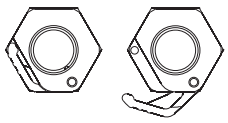
17× Standard
3× Stainless steel
10× PTFE-coated, weld-immune

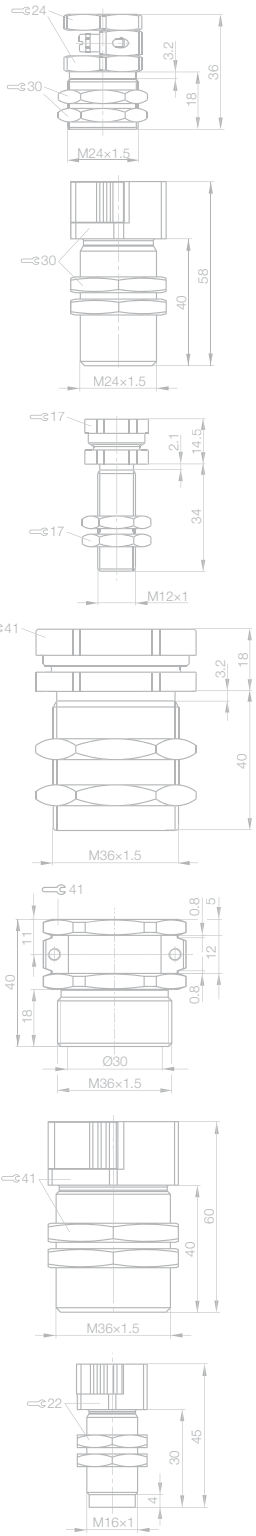
12× Standard with latch
6× Standard with latch
PTFE-coated, weld-immune
6× Stainless steel with latch
6× Stainless steel with latch
PTFE-coated, weld-immune

5× for installation in containers

65 clamp variants!

Balluff has revolutionized methods for attaching sensors with the new latch clamping principle. The sensor is inserted into the clamps and secured in position by folding over the latch. The latch can secure any sensor in all areas of the automation sector without the use of tools.

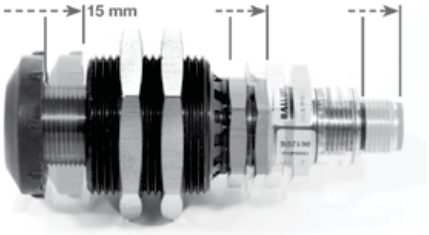




Clamp Overview

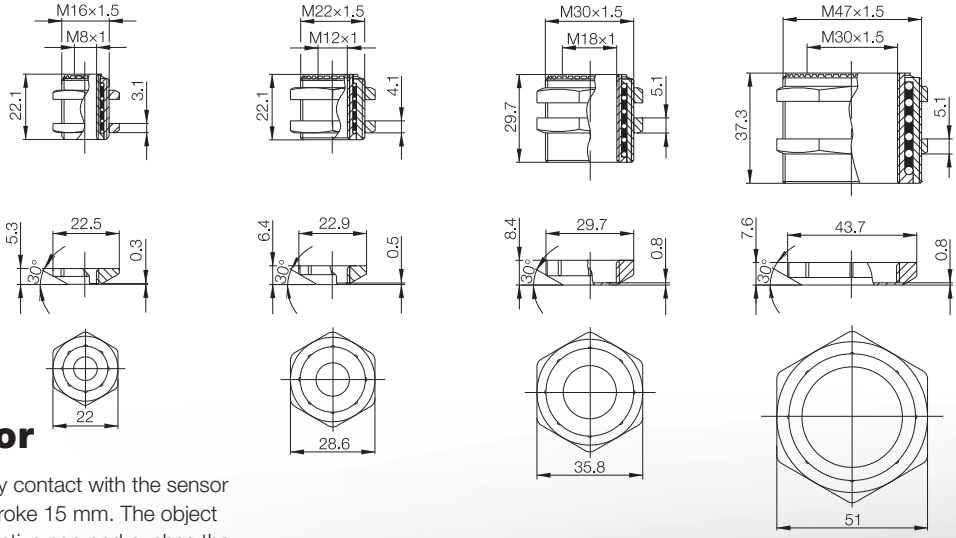
65 clamp variants

Stainless Steel



- For all areas in the automation and material handling industry
- Protects your sensors
- Increases system reliability

Description	**Contact protector**	**Contact protector**	**Contact protector**	**Contact protector**
Version	For **M8** sensors for mechanical protection	For **M12** sensors for mechanical protection	For **M18** sensors for mechanical protection	For **M30** sensors for mechanical protection
Ordering code	**BAM015U**	**BAM015W**	**BAM015Y**	**BAM015Z**
Part number	BESA 08-CM	BESA 12-CM	BESA 18-CM	BESA 30-CM
WAF	22	29	35	51
Ambient temperature range	–45...+85 °C	–45...+85 °C	–45...+85 °C	–45...+85 °C
Material	Anodized Al, POM	Anodized Al, POM	Anodized Al, POM	Anodized Al, POM

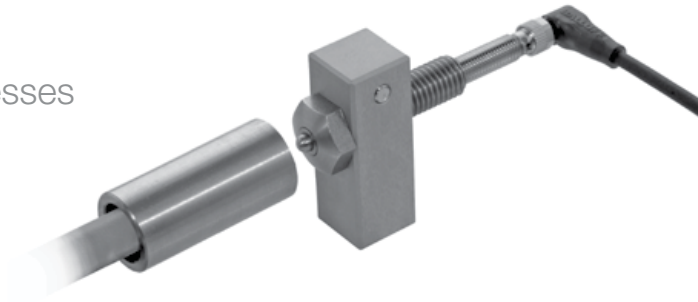


Contact protector

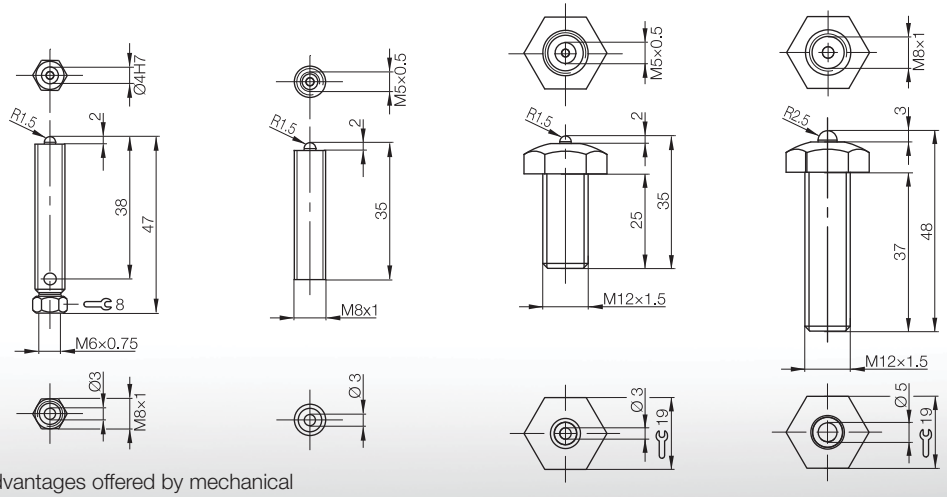
The contact protector absorbs any contact with the sensor while preventing damage, max. stroke 15 mm. The object runs up against an attached protective cap and pushes the sensor back, preventing damage to the sensor or the coil as a result. The contact protector ensures 100 % reliability and the previously stored sensor position is retained.

Contact Protector and Tube Switch

Reliable protection for your sensors and processes



Description	**Tube switch**	**Tube switch**	**Tube switch**	**Tube switch**
Version	For sensors **dia. 4 mm** for mechanical protection	For **M5** sensors for mechanical protection	For **M5** sensors for mechanical protection	For **M8** sensors for mechanical protection
Ordering code	**BAM01C0**	**BAM01AZ**	**BAM019Y**	**BAM019W**
Part number	BAM FS-XE-002-D4-4	BAM FS-XE-001-M5-4	BAM FS-XE-003-M5-4	BAM FS-XE-004-M8-4
Spring force F (N)	3	3	3	4
Impact force $F_{max.}$ (N)	400	400	400	400
Switching operations min. (with $F_{max.}$)	500000	500000	500000	500000
Housing material	Stainless steel	Stainless steel	Stainless steel	Stainless steel



Tube switch

The tube switch combines the advantages offered by mechanical position switches and inductive sensors. Manufactured from stainless steel, it is extremely robust, very reliable even under difficult conditions and can be used immediately in any application in combination with the relevant inductive sensor.

Conception and Planning
Product and Application Advice
Customized Solutions
Targeted Training

Service

The right solutions

Less time required

High application security

Significant cost reduction

OP

Service

Customized. According to your specifications. Built with Balluff quality.

We give you comprehensive service over the entire life cycle of our products: including the conception and planning of your projects, testing and setup on site, and training and support. For an optimal implementation.

This creates the greatest possible planning security and provides faster commissioning and an earlier start of production. This leads to maximum productivity and more cost-effectiveness. And you are relieved of day-to-day tasks, so that more time remains for your really important jobs. Explore all the services Balluff has available.

Application advice through our Tech Support:
Discuss your technical requirements. And take advantage of our expertise.

Real-world examples:
- Selection of the correct identification procedure for an assembly line
- IO-Link concept as a cost-effective alternative to conventional wiring
- System consulting for radio frequency identification (RFID): identification in adverse environments
- Recognizing multiple containers on a pallet in goods

Commissioning:
Order expert knowledge. And benefit from a quick start of production.

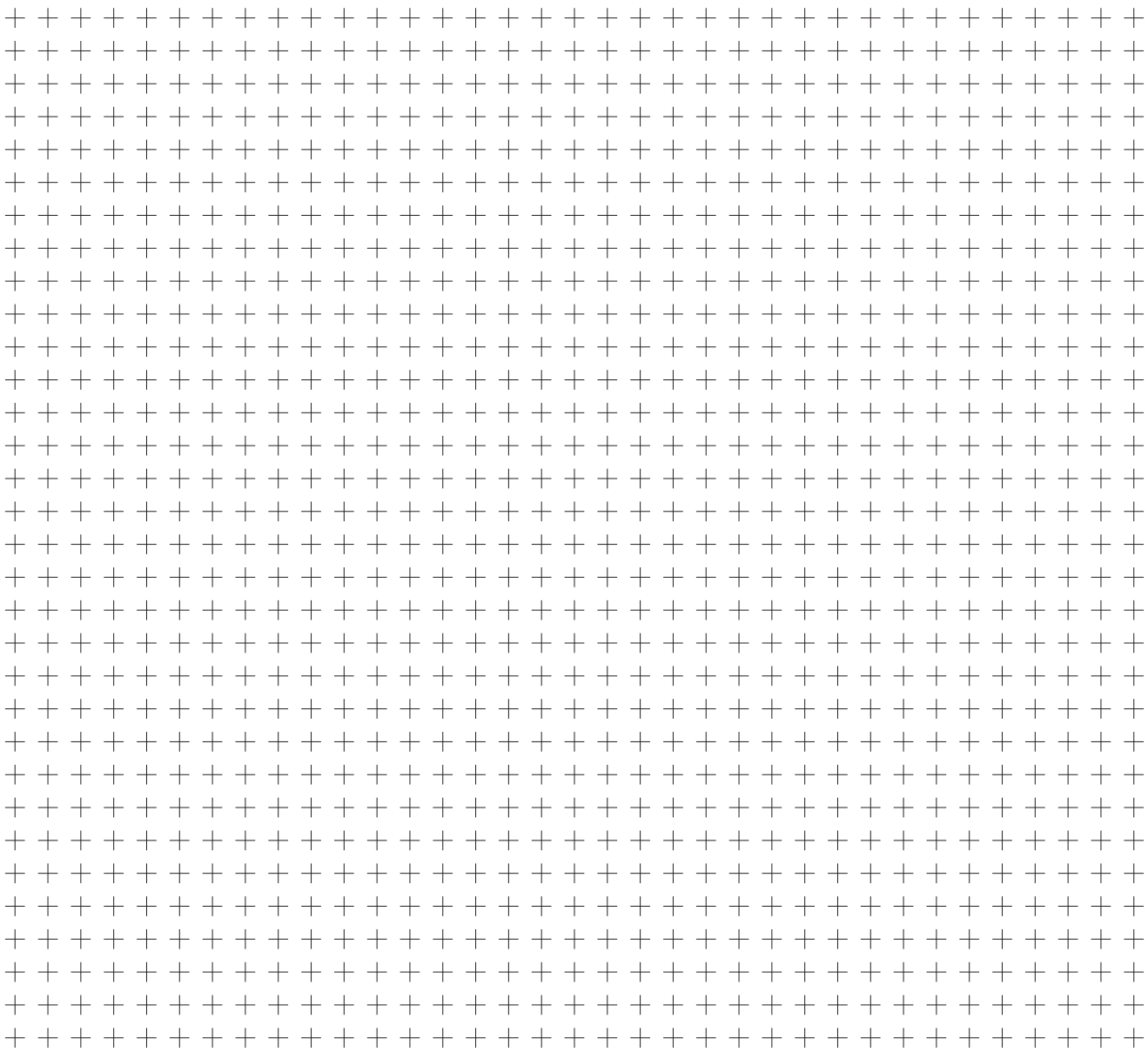
Real-world examples:
- Setting up an optical checkpoint with the BVS vision sensor
- Consulting and support during the programming of BIS RFID systems
- Installation and commissioning of a color detection application with the BFS color sensor

Fully customized products:
Order individual versions according to your requirements: from preassembly to engineering services. And take advantage of the optimum.

Real-world examples:
- Extending the housing of a BHS high-pressure resistant inductive sensor
- Extra threads for the housing cover of a BTL micropulse travel sensor
- Customer-specific holder for a RFID data carrier
- Adaptation of the characteristics for BAW analog sensors

Workshops:
Make use of well-founded manufacturer knowledge. And benefit from application security.

- **Professional sensor use:** Select effective principles, install sensors professionally and secure the reliable operation of your application.
- **RFID:** The right data at the right time at the right place.
- **Vision sensor:** Using an image processing sensor, ensure manufacturing quality in three steps.
- **Vision sensor ident:** Reliably identify data matrix codes with an image processing sensor.
- **Industrial networking with IO-Link:** Manage signals intelligently and cost-effectively.



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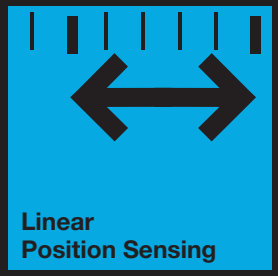
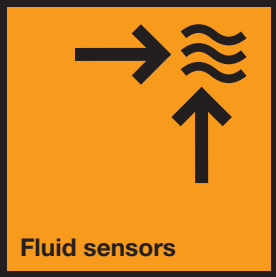
sensors worldwide

SENSOR SOLUTIONS AND SYSTEMS

As a recognized partner in all sectors of the automation industry, Balluff offers comprehensive expertise in sensor technology and networking. We supply advanced technology and state-of-the-art electronics to our customers, who benefit from excellent service, application-specific solutions and individual consultation. You too can benefit from the excellent quality of our products and services.





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